ELECTRICAL WEST

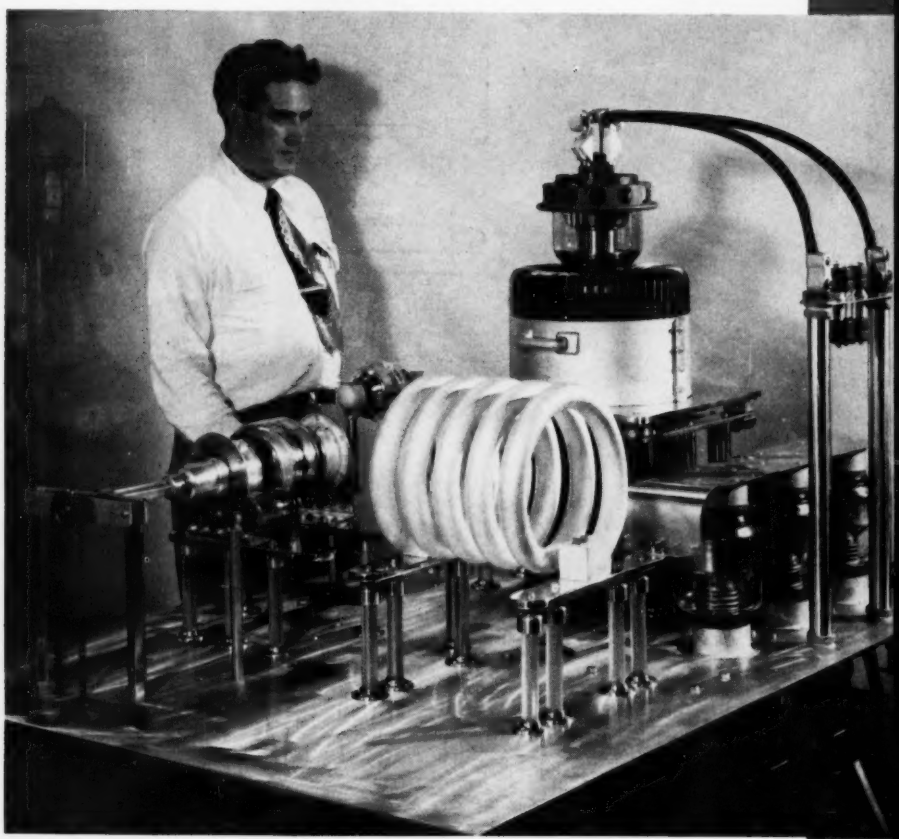
January 1953
25 Cents

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U.S.

Spokane Dealers Find Own Answers 97

What Space Does to Speed Service 92

San Diego Sales Show 96



Making Small Trees Into Large Lumber
by Lewis B. Reed 90

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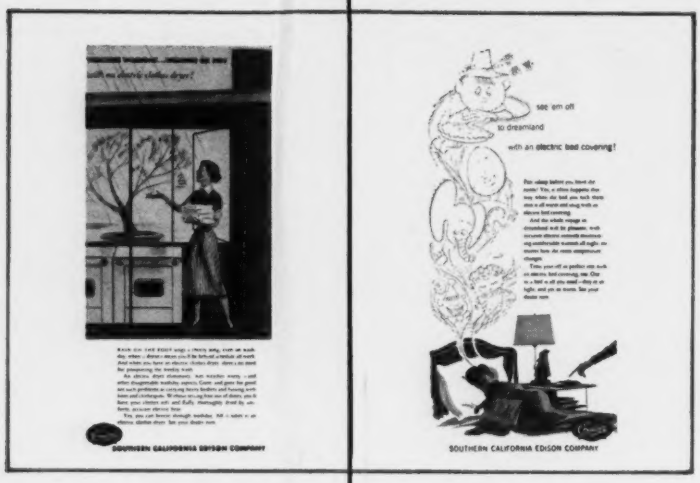
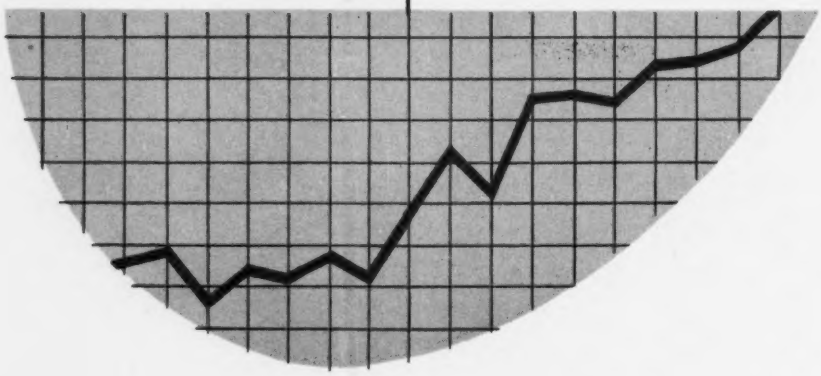


Setting sale again!

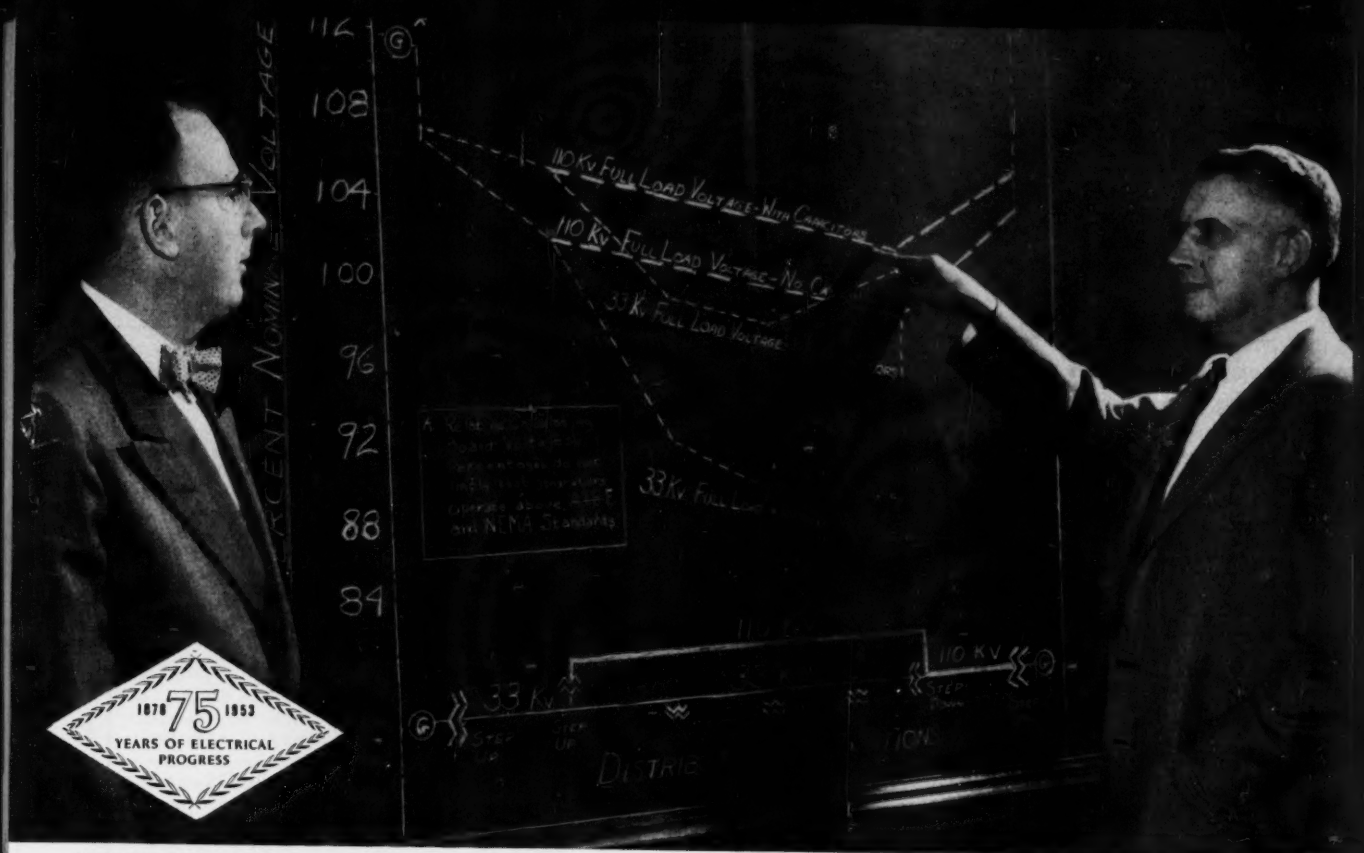


Again this year, helping appliance dealers to make sales is one of the first orders of business on the Edison calendar. It's that way *every* year, and has been for more than half a century.

As usual, too, no time has been wasted.

Edison advertising is already off to a flying start on its part of the "Edison tells them, and the dealer sells them!" campaign for 1953.

SOUTHERN CALIFORNIA EDISON COMPANY



VOLTAGE IMPROVEMENT obtained with switched capacitors is discussed by F. M. Reed, (right), System Planning Engineer for Pennsylvania Electric, and A. M. Dawson, G-E Sales Representative. Blackboard diagram summarizes effect of capacitors on system regulation.

G-E switched capacitors help regulate voltage on Penelec's whole system

120,000 kvar of capacitors give system-wide voltage-boost, release kilowatt capacity—reduce system investment.

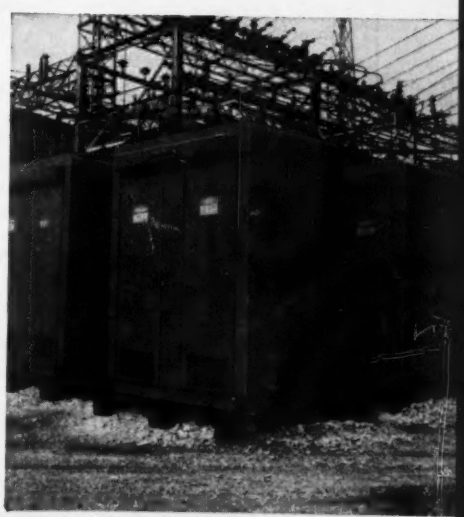
To complement its generator bus regulation, the Pennsylvania Electric Company of Johnstown, Pa. has installed 120,000 kvar of switched capacitors. Within the next year, this will be increased to 150,000 kvar or 1 kvar for every 3.64 kw of its estimated 1953 peak load of 546,000 kw.

The automatically controlled capacitors assure adequate local generation of kilovars and provide a needed voltage boost on distribution circuits. But they do more than this.

By relieving transformer, transmission, and generating facilities of reactive load, the capacitors reduce voltage drop and improve voltage regulation throughout the entire system—as much as 20% at full load at the distribution level.

This permits the Penelec system to carry more kilowatts within the limits of good regulation. And since the cost of capacitors needed to release capacity is less than the cost of new capacity, the system investment per kilowatt is reduced.

G-E automatically switched capacitors may prove economical on your system, too—for improving voltage, releasing capacity, reducing losses, and keeping system investment down. For more information, get in touch with your local G-E Apparatus Sales Office. General Electric Company, Schenectady 5, New York. 441-1



58,000 KVAR of switched capacitors at Penelec's substations use current compensated voltage control to provide bulk kilovars, improve regulation when load is heavy. An additional 62,000 kvar of switched capacitors are installed out on feeders. Units boost voltage, reduce losses by an estimated 8%.

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

JANUARY 1953

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VOL. 110
NO. 1

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W. A. Cyr, Associate Editor
Peggy Boyer, Associate Editor
Walter C. Heston, Engineering Editor
John Cootz, Typography

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DEPARTMENT

Associations	106	Ne	
Books	60	Ne	
Bulletins	56	NV	
Contractors' News Letter	85	PC	
Editorials	94	Sales Guide News Letter	101
Electra's Husband	58	Advertising Index	136

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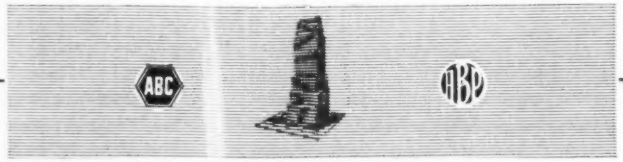

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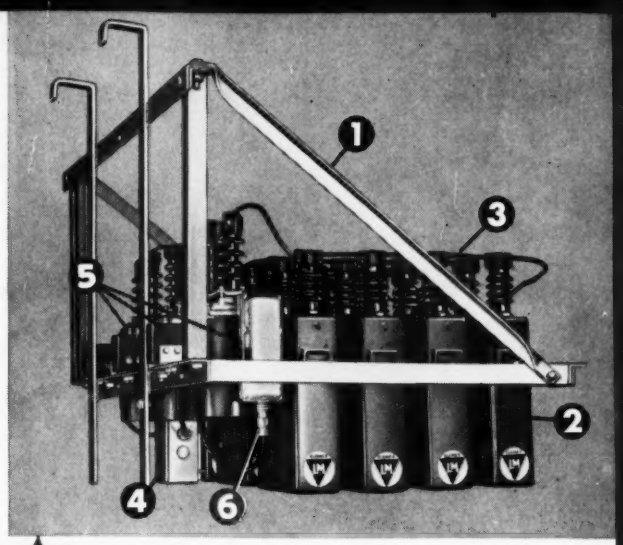

▲ Details of the L-M racks. (1) Rugged angle steel rack. (2) Elemex Capacitors. (3) Neoprene-covered wiring with Neoprene terminal caps. (4) Weatherproof terminal box for low voltage control wiring is easily accessible. (5) L-M Type NR oil switches. (6) Weatherproof plug-in connection to switch.

New and Exclusive Oil Switch Plug-In Connection Simplifies Maintenance

A weatherproof plug-in connection and weatherproof plug at the base of the oil switch control housing permits the switch to be disconnected without disturbing any of the low voltage wiring. Only one easy-to-reach connection to break and the switch is ready to be removed for service. It's so simple that the three switches can be disconnected in less than a minute.

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AMZOW, Manager, Capacitor Sales, Line Material Company

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Switched or Unswitched Assemblies

Assemblies may be switched or unswitched. Switched racks are provided with L-M's motor-operated "NR" oil switch in each phase. These are electrically interconnected to give three-phase operation. Control connections are made to a weatherproof terminal box mounted in the rack. Only simple, low-voltage wiring is necessary. For control, L-M's Type CCV voltage-sensitive control is suggested. This control can be adjusted in the field without test equipment. Time clocks or pilot control also may be used.

Fully Tested and Guaranteed

Elemex Capacitors are 100% tested during and after manufacture, and the completely wired assembly, including switches, is thoroughly retested and guaranteed. Thus the operator using these assemblies is assured of dependable operation, with an appreciable saving in overall costs.

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L-M's completely wired capacitor assemblies are available in 5 kv and 15 kv racks up to 300 kvar switched or 375 kvar unswitched. Total cost of switched banks is as low as $5.66 per kvar, and unswitched banks as low as $4.52 per kvar, completely wired!

Get Full Information

For full information on ELEMEX Capacitors and L-M's completely wired assemblies, ask the L-M Field Engineer; or write Mr. Zamzow at Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

LINE MATERIAL 104

Elemex Capacitors

Complete Coordinated Equipment for Distribution Today

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Power Unlimited for Rocky Mountain Area by L. R. Patterson **76**
Large Crane Makes Big Utility Jobs Easy **79**

LIGHTING AND WIRING

Hot Wires and the Safety Orders **80**
Industrial Systems Should Operate Grounded **82**
Making Small Trees Into Large Lumber by Lewis B. Reed . . **90**
What Space Does to Speed Service **92**

SALES

Familiar Events Draw Throngs to San Diego Show **96**
Spokane Dealers Find Own Answers **97**

DEPARTMENTS

Associations	106	New Products	34
Books	60	News	116
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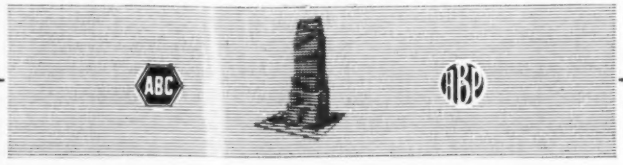

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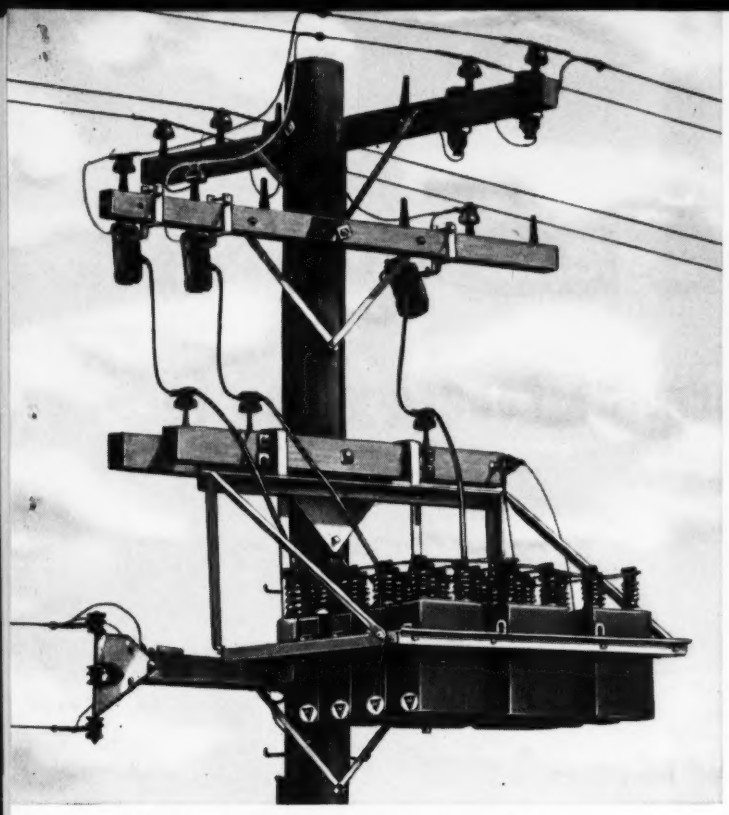
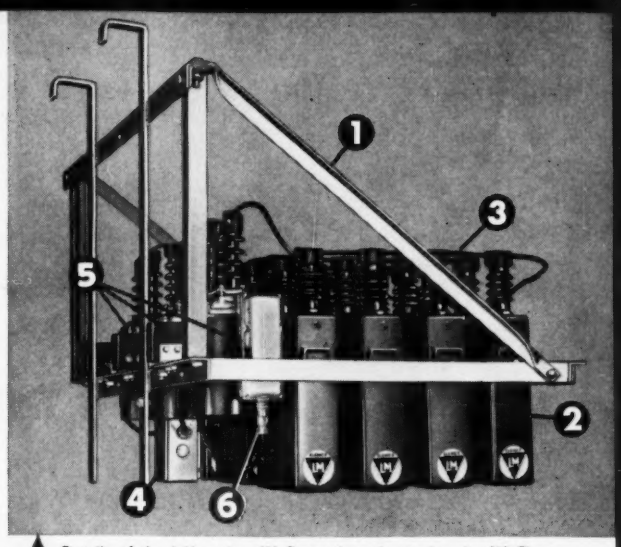


A 300 kvar switched capacitor rack serving a suburban area. Note the simple, compact arrangement and accessibility of the entire assembly. Wiring is completely bird-proof.



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L-M's Open Rack Capacitor Assemblies Are Completely Wired To Save Linemen's Time

by **HAROLD T. ZAMZOW,** Manager, Capacitor Sales, Line Material Company

With completely assembled capacitor racks, wired at the factory, the cost of installation of either switched or unswitched banks is greatly reduced. This becomes a major factor when one considers both installation costs and the availability of capable linemen.

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LINE MATERIAL 104

Elemex Capacitors

Complete Coordinated Equipment for Distribution Today

IT'S BLOWIN'

yep, a storm of record sales for

FLASH!

Brand-new Hemcolite S-R® blades now on all Westinghouse 10-in. Fans

Now, all Westinghouse 10-inch Fans will give that whisper-quiet, ultra-safe performance that *only* the new *Hemcolite S-R* Blades—a Westinghouse exclusive—can give. They're perfectly balanced, too . . . won't warp, bend, rust or discolor. *What a sales story!*

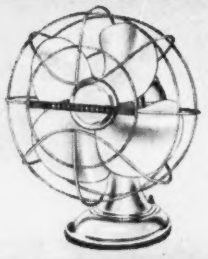
Take a look at this '53 Westinghouse Fan lineup! It's sure to be a trade sensation . . . for looks, performance, *price.*

Remember the fan *famine* that hit last year? During summer's sizzling peak, stocks melted overnight. Retailers were swamped by orders that couldn't be filled.

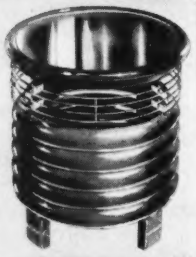
So *now's* the time to order these *new* Westinghouse Fans in plenty . . . to fill unfilled orders and to meet the deluge to come. Call your distributor today about the big "Early Bird" Free Deal! Westinghouse Electric Corporation, Electric Appliance Division, Springfield 2, Massachusetts.

10LA4
10-inch Livelyaire®
1-Speed . . . Oscillating

FLASH! now all



12LA3
12-inch Livelyaire with Powersphere® Metal Blades
2-Speed . . . Oscillating



16DA2
16-inch Debonaire
2-Speed . . . Hassock-type

16WA2
20WA2
16-inch and 20-inch Whirlaires®
2-Speed, long-range circulators

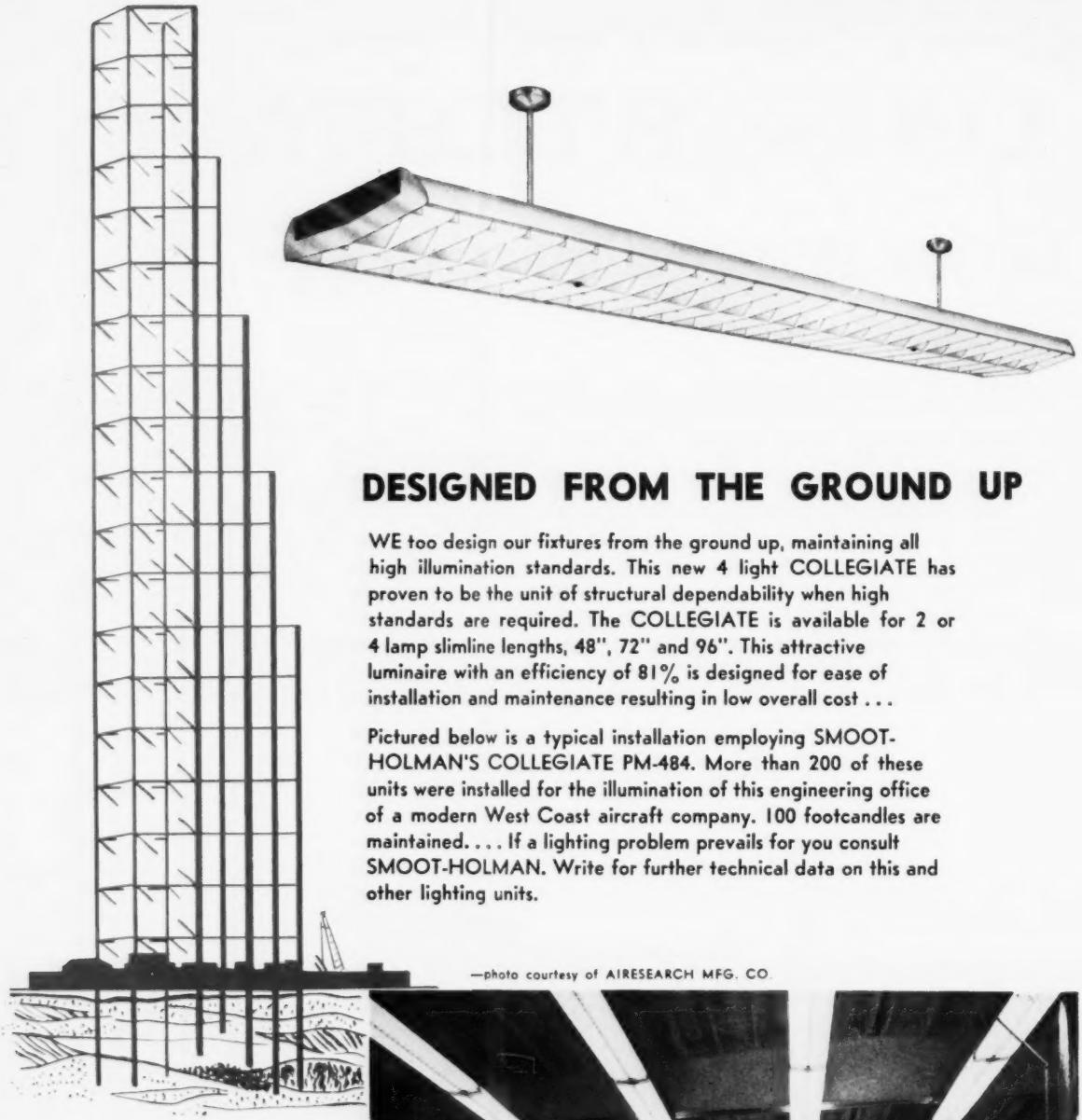
ATTENTION, EARLY BIRDS!
AMAZING *FREE* DEALS!
ASK YOUR DISTRIBUTOR!

- **Big Ice-Cake Display—ABSOLUTELY FREE.**
- **Plastic Cover for Popular 10-inch Powerаire® Fan—ABSOLUTELY FREE.**
- **$29.95 Powerаire Window Ventilator—ABSOLUTELY FREE.**
- **Complete $10.00 Promotion Package—ABSOLUTELY FREE.**

ORDER NOW! DON'T FORGET LAST YEAR'S FAN FAMINE! FULL STOCKS MEAN FAT PROFITS!

UP A STORM!

the new 1953 Westinghouse Fans



DESIGNED FROM THE GROUND UP

WE too design our fixtures from the ground up, maintaining all high illumination standards. This new 4 light COLLEGIATE has proven to be the unit of structural dependability when high standards are required. The COLLEGIATE is available for 2 or 4 lamp slimline lengths, 48", 72" and 96". This attractive luminaire with an efficiency of 81% is designed for ease of installation and maintenance resulting in low overall cost . . .

Pictured below is a typical installation employing SMOOT-HOLMAN'S COLLEGIATE PM-484. More than 200 of these units were installed for the illumination of this engineering office of a modern West Coast aircraft company. 100 footcandles are maintained. . . . If a lighting problem prevails for you consult SMOOT-HOLMAN. Write for further technical data on this and other lighting units.

—photo courtesy of AIRESEARCH MFG. CO.

SMOOT-HOLMAN

SMOOT-HOLMAN COMPANY

ILLUMINATION EQUIPMENT
INGLEWOOD CALIFORNIA

Offices in Principal Western Cities

Branch and Warehouse in San Francisco

ICE CAN MAKE A HOT LINE COLD

IF SUSPENSIONS CAN'T STAND THE STRAIN!

Purified Porcelain is good insurance against the hazards of winter. This finest insulator porcelain ever made has unequalled ability to stand stress and strain. Cement is specially compounded and caps and pins are scientifically designed for maximum strength. Victor insulators withstand pull of ice, snow, high winds and endure thermal variations far above NEMA standards. For engineering data on these and other Victor *Purified Porcelain* insulators, send for Bulletin No. 4.

Every Victor Suspension Insulator undergoes this routine tensile test before electrical flashover test.

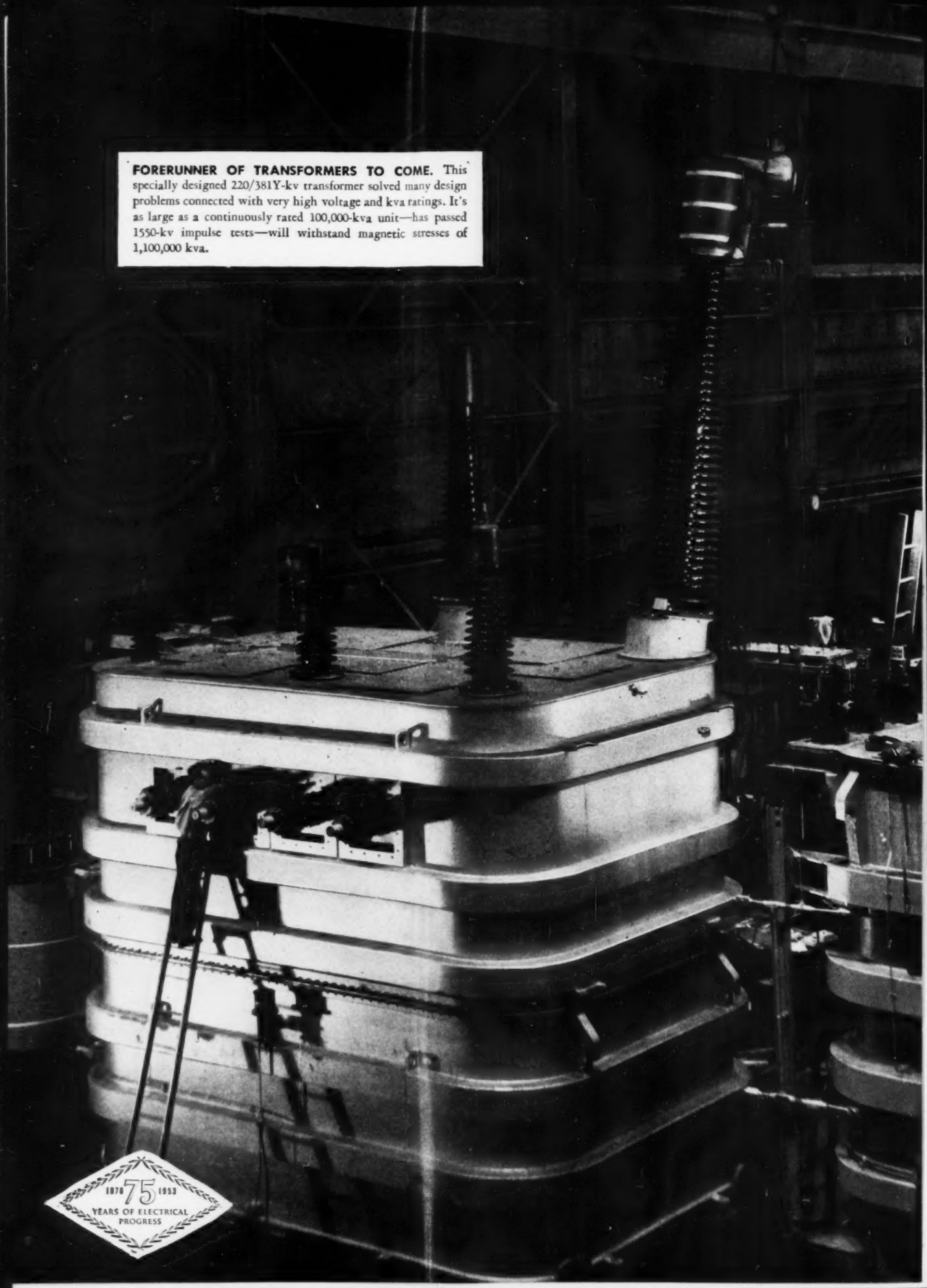
FREE BOOKLET gives you the full story on how Victor Insulators are made—how and why *Purified Porcelain* was developed. Write us for your copy.

VICTOR NO. 900 SUSPENSION

Specify VICTOR INSULATORS

VICTOR INSULATORS, INC., VICTOR, N. Y.

Low and High Voltage Pintypes • Suspensions • Guy Strains • Spools • Switch and Bus Insulators • Custom Designed Porcelain



FORERUNNER OF TRANSFORMERS TO COME. This specially designed 220/381Y-kv transformer solved many design problems connected with very high voltage and kva ratings. It's as large as a continuously rated 100,000-kva unit—has passed 1550-kv impulse tests—will withstand magnetic stresses of 1,100,000 kva.

"CONCENTRIC LAYER" transformers withstand short-circuit forces of 1,100,000-kva duty

Units, impulse-tested at 1550 kv full wave, are installed in General Electric's new Switchgear Development Laboratory at Philadelphia.

Transformers for repeated short-circuit duty. Two 220,000/381,000Y—7750/15,500-volt transformers, connected to special short-circuit generators, supply the power that permits the new Switchgear Laboratory to simulate actual system faults. Each transformer can deliver 1,100,000 kva for a period of 10 cycles . . . and repeat this performance 15 times an hour.

"Concentric layer" winding solves short-circuit problems. The extremely severe duty requirements of these transformers were readily satisfied by the "concentric layer" winding. In this design, the conductor is wound in successive layers arranged concentrically and connected in series.

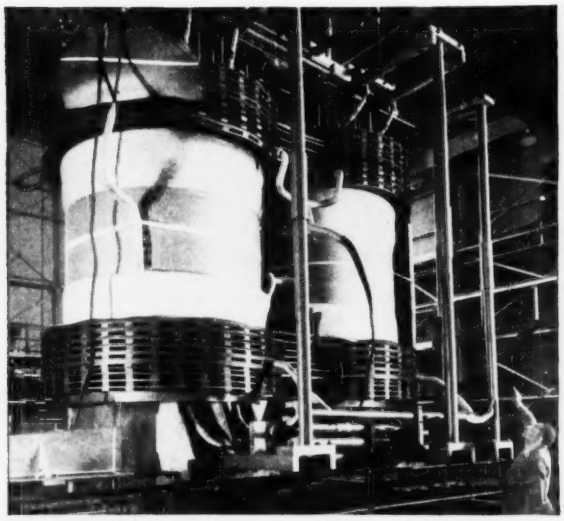
High short-circuit strength is inherent since major magnetic forces (as high as 2800 tons) are radial and well within both the tensile strength of the high-voltage conductors and the compressive strength of the cylinder on which the low-voltage coil is wound.

Impulse strength to withstand 1550-kv test was achieved readily with the "concentric layer" design. Voltage stress between layers is limited to the voltage of one layer since adjacent layers are connected in series.

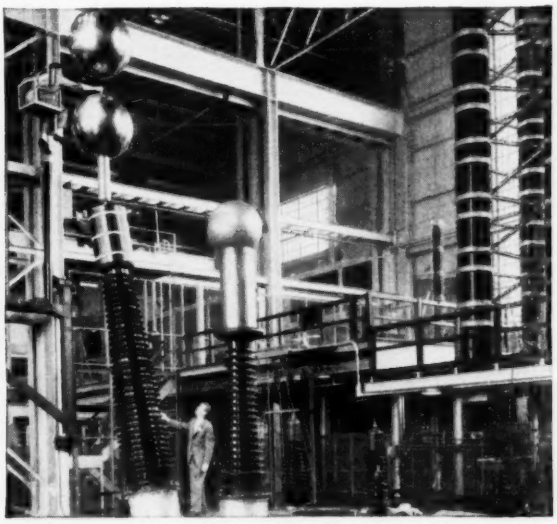
The cylinders of insulation between the layers are flanged over the ends of the winding to eliminate creepage in the direction of high electrical stress.

Uniform distribution of impulse voltages throughout the windings is assured by complete electrostatic shielding.

"Concentric layer" transformers for your system. These testing transformers, while designed to meet unusual requirements, demonstrate the excellence of "concentric layer" windings for high-kva, high-voltage service. If you are using or contemplating voltages 161 kv and above, you may wish more information on this design. Ask your local G-E apparatus sales representative for Bulletin GER-129, or write Section 401-31, *General Electric Co. Schenectady 5, New York.*



INHERENT SHORT-CIRCUIT STRENGTH of "concentric layer" design results from circular shape of coils and a highly developed winding technique. Conductor wound "on edge" provides maximum bearing surface for withstanding short-circuit forces.

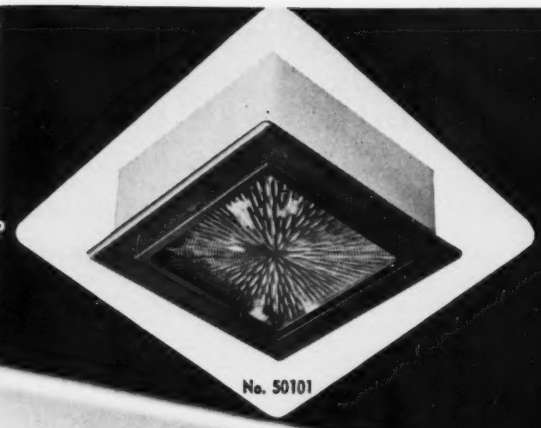


282% OF RATED VOLTAGE. Test man sets 100 CM gaps for induced voltage test at 282% of rated voltage. Electrostatic shielding between all high-voltage-winding layers assures uniform impulse distribution in spite of the numerous tap leads brought outside the transformer.

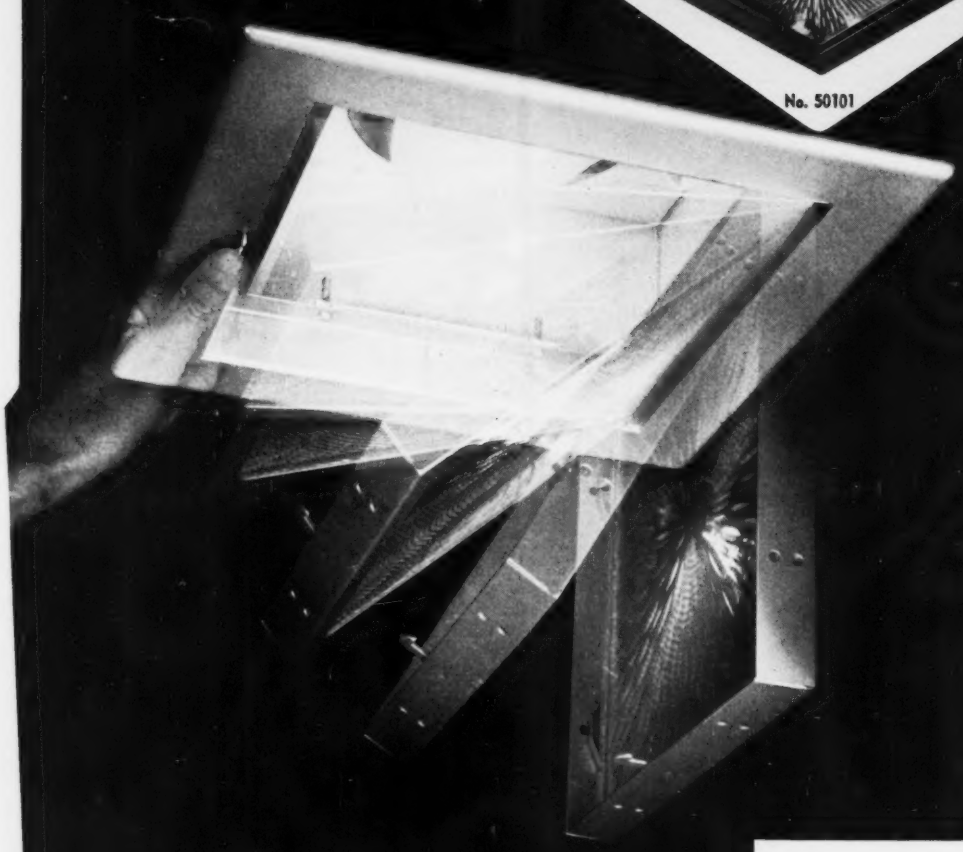
GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

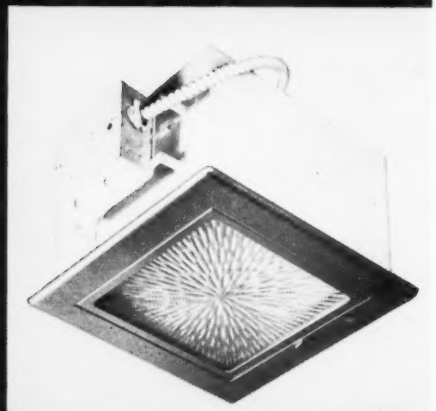
MAINTENANCE SIMPLICITY AT YOUR FINGER TIP



No. 50101



Sunbeam's new recessed incandescent line of lighting fixtures embodies advance engineering and design features. Scientifically designed Controlens* elements are used to provide positive control of the light distribution which is determined by the function of the lighting quality desired. Sturdy construction and facilities for easy installation will be welcomed by electrical contractors. Accessibility and minimum maintenance effort achieved at practically the touch of the finger. The drop-type hinged bottom frame opens by gravity when the "finger tip control" latch is released and locks automatically when closed.



No. 60101–J

SUNBEAM visionaire

SUNBEAM LIGHTING COMPANY

777 EAST 14TH PLACE · LOS ANGELES 21, CALIFORNIA

* Holophane Co., Inc.

"We get CONSISTENTLY EXCELLENT RESULTS with D-H ALLOYS"

...says Resistance Products Company, of Harrisburg, Pennsylvania

This company produces precision wire-wound resistors of utmost stability for electronic equipment used by the Armed Forces and for makers and users of test instruments, meters, and scientific apparatus of various types. The vital accuracy of much important equipment, therefore, is very dependent upon the quality of the resistors coming off the production lines of Resistance Products Company.

In view of this, Driver-Harris is particularly gratified to have Resistance Products state: "Reflecting our experience with Driver-Harris alloys is our large use of Karma wire. Currently, we are employing Karma for numerous critical applications where utmost stability, together with high resistivity and low temperature coefficient of resistance, is requisite. *Consistently excellent results* are being obtained. We have, in fact, used Karma with outstanding success ever since its introduction several years ago. It is our belief the development of this alloy constitutes a major forward step."

Karma* is ready to serve you, too; as are world-famous Nichrome* and Nichrome V, and over 80 other alloys developed by Driver-Harris for the electrical and electronic industries. We feel confident that, like Resistance Products Company, you'll realize exceptional advantages by putting one or more D-H alloys to work for you. Let us have your specifications. We'll gladly make recommendations based on your specific needs and have our engineering department help you obtain best results.

KARMA* and world-famous Nichrome*
are manufactured only by

Driver-Harris Company

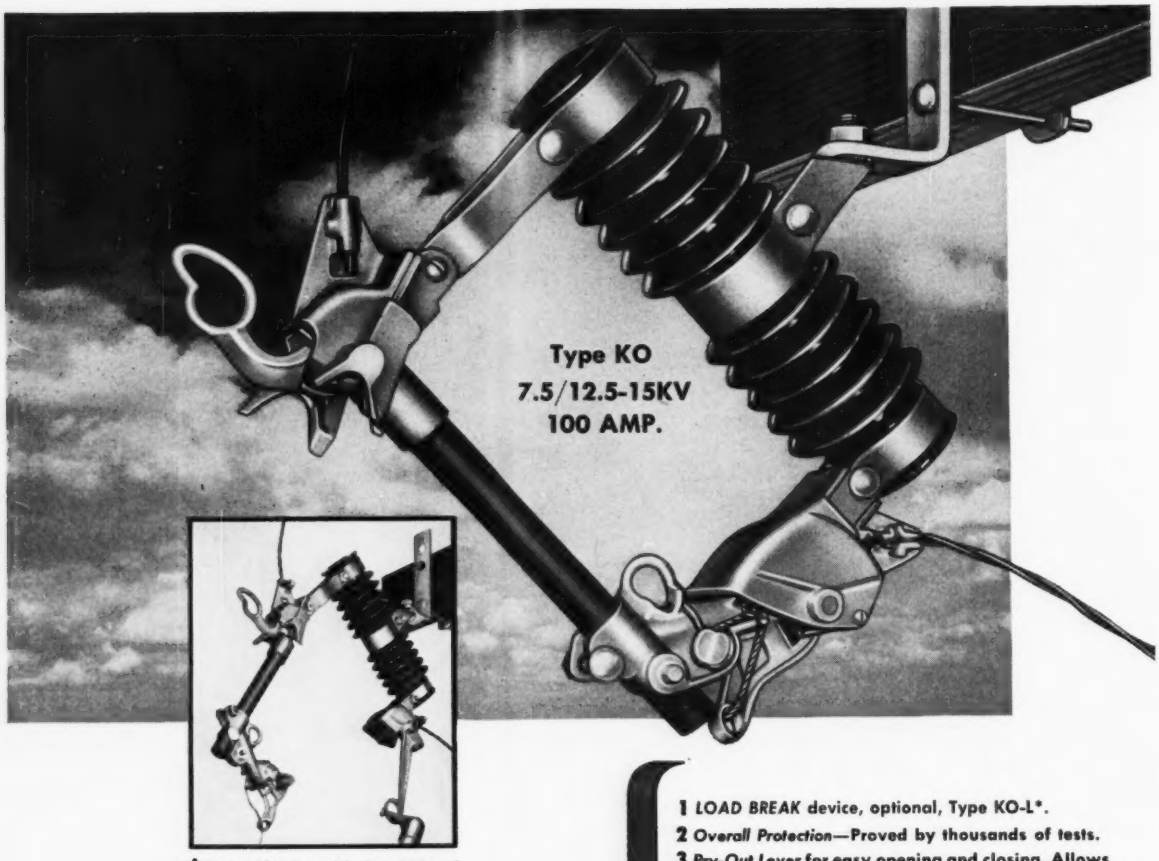
Western Representative: **ANGUS-CAMPBELL, INC.**

5320 Santa Fe Ave., Los Angeles 58 917 Bryant St., San Francisco, 3

Main Office and Plant: HARRISON, NEW JERSEY

*T.M. Reg. U. S. Pat. Off.

MAKERS OF THE MOST COMPLETE LINE OF ELECTRIC HEATING, RESISTANCE, AND ELECTRONIC ALLOYS IN THE WORLD



*Type KO-L, with Load Break

Only CHANCE KO gives you all these features

There's a big difference in cutouts! *Overall protection* throughout the entire interruption range—all-weather operation—positive fuse coordination—low radio noise level . . . are just a few important things to look for when choosing *your* cutouts.

Compare the CHANCE KO with any other cutout. Compare it electrically. Compare it mechanically. Test it from maximum rated interruption to your lowest currents . . . you'll find that the CHANCE KO gives top performance because the KO is the basic design for the type KO-L—which is built for load break operation.

Order through your regular supplier—specify CHANCE KO or KO-L.

1 *LOAD BREAK* device, optional, Type KO-L*.
2 *Overall Protection*—Proved by thousands of tests.
3 *Pry-Out Lever* for easy opening and closing. Allows the use of heavy duty contact springs without requiring extra effort to remove tube.
4 *Exclusive Ejector Mechanism* provides fast complete ejection of fuse link before contacts part—even on a low current interruption.
5 *Sleet Shields for All-weather Operation.* Protect contacts and operating mechanism and prevent water from entering the tube to cause twisting and swelling of the fiber.
6 *Mechanical Time-Delayed Contact Separation.* Prevents pitting or burning of contacts.
7 *Pivot Bracket* (E.E.I.—NEMA) for cross-arm mounting. A special bracket is available for pole mounting.
8 *Positive Semaphore Indication* to show if cutout was opened manually or by a protective operation.
9 *Easy Reloading*—simple hook stick operation from any angle.
10 *Link Element Protection*—Link tension not affected by closing action. Eliminates breakage or damage to time-current characteristics of link.
11 *Overtravel Stops*—Protect pressure contact springs.
12 *Safety to Operator*—Tube angle directs expulsion gases away from lineman when operating cutout.

You know it's RIGHT when you specify CHANCE

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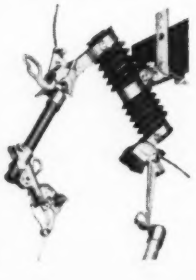
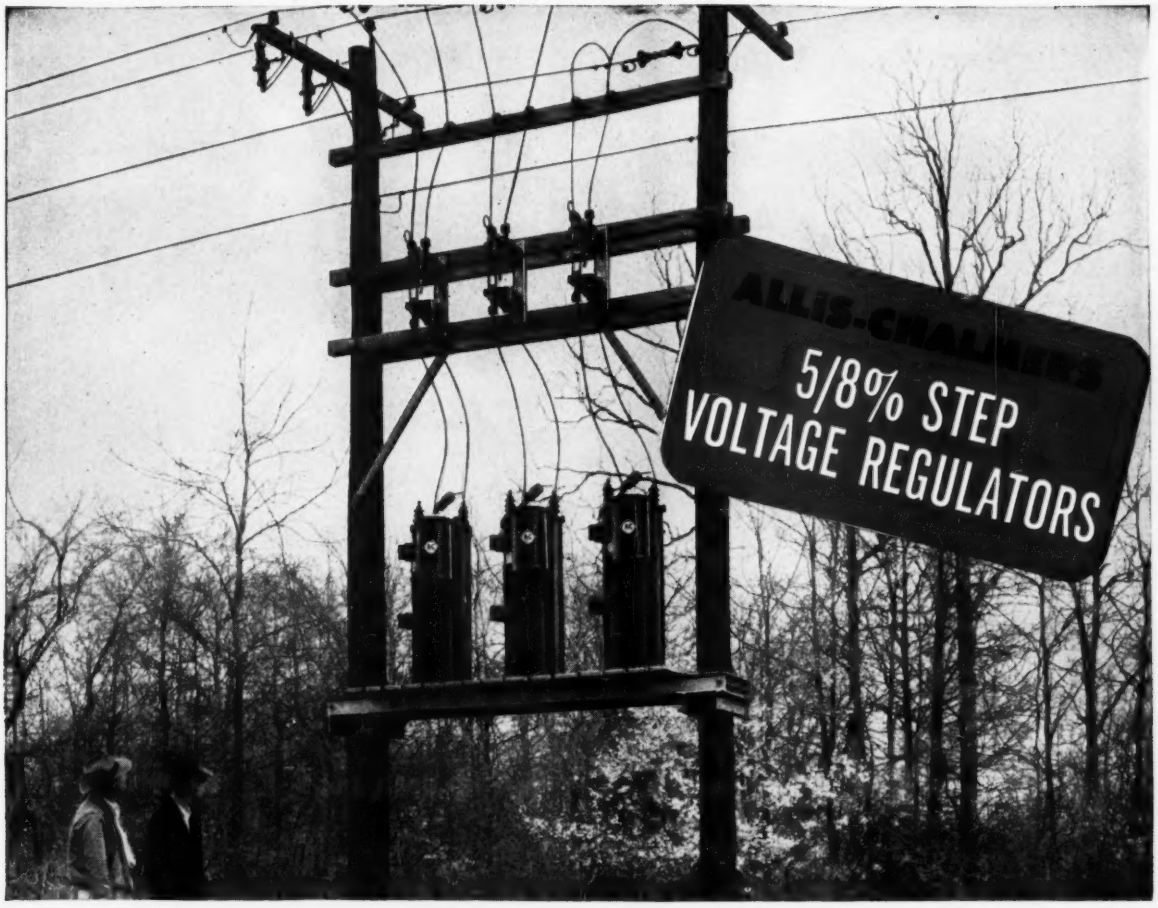
* Chance Type KO-L gives load break operation with full interrupting capacity. It's not just a cutout with a load break attachment—it's *built to break loads.* This load break costs only $2.00 extra! Get full information today.



C52-11



Get Voltage Regulation at Low Cost

With All 32-Step Regulator Advantages

HERE'S THE ANSWER to your voltage problems. Allis-Chalmers distribution regulators are low in cost. They are easy to install, simple to maintain. And they give *all* the advantages of Allis-Chalmers ⅝% step regulation: a narrow ± 1 volt band, 20% range of regulation, long-life contacts, and *Feather-Touch* control.

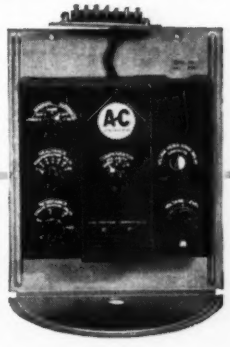
In addition, Allis-Chalmers distribution regulators have proved their reliability in eight years of field operation. Experience has also proved another major advantage: they are flexible. Their ease of installation and setting makes it easy to shift them from feeder to feeder.

Get all the facts on these low cost units. Call your nearest A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3882

RATINGS AVAILABLE	7620 Volts—15, 50, 100 amp 5000 Volts—50, 100 amp 2500 Volts—100, 200 amp

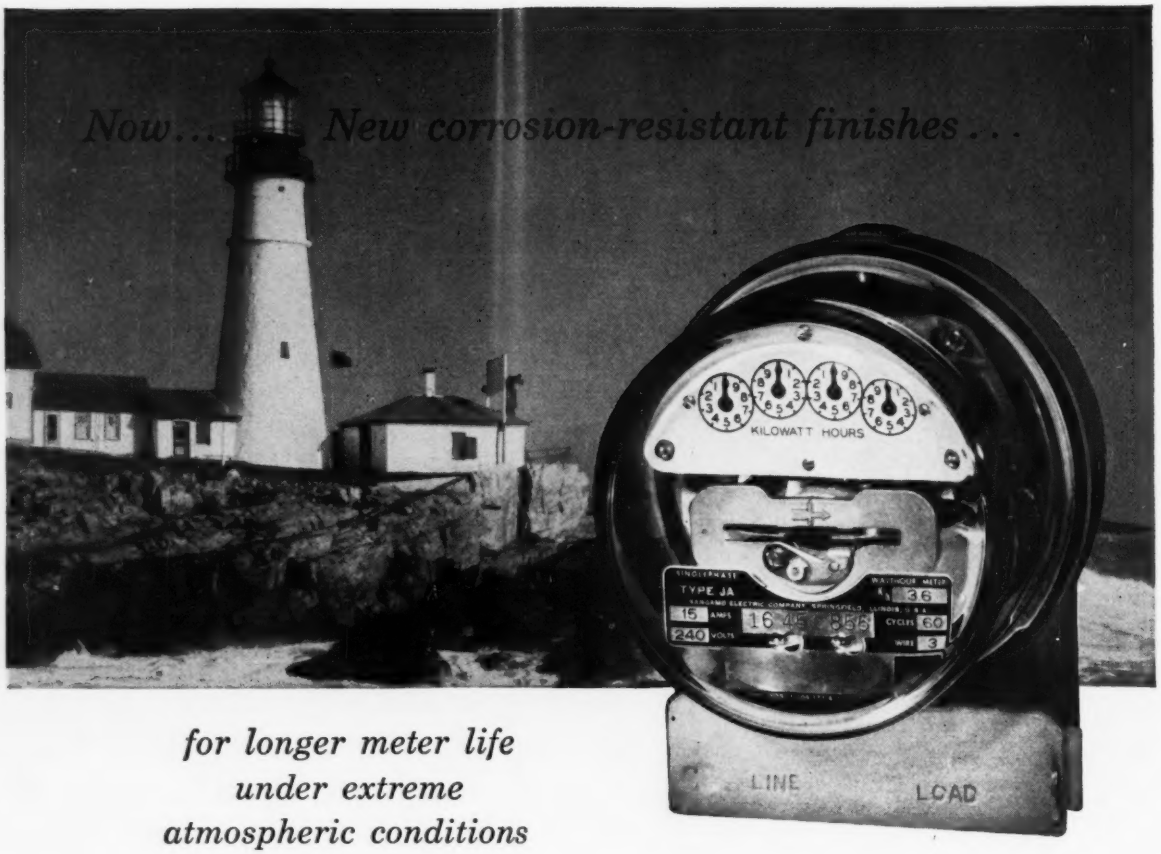
Feather-Touch *Control Simplifies Installation*

There's just one adjustment to make when installing — set the calibrated voltage level. For more facts, write for Bulletin 01M7866-1.



ALLIS-CHALMERS

Originators of ⅝% Step Regulation



for longer meter life under extreme atmospheric conditions

Sangamo J Meters

Longer meter life—even under the most severe service conditions, is the subject of constant study and research at Sangamo.

As part of Sangamo's continuous program of improvement, new alloys and surface treatments are now incorporated in Type J Watthour Meters. All aluminum, copper alloy, and ferrous parts are treated with finishes proved most suitable for protection against attack from moisture and from air-borne organic and inorganic substances.

These finishes give greater protection to both external and internal meter parts and assure better performance in humid, salt-laden or corrosive atmospheres. This greatly extends useful meter life under extreme atmospheric conditions.

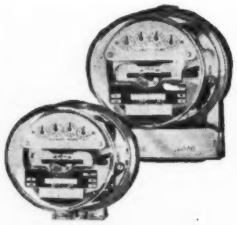
As new technologies develop, they will be used by Sangamo to still further increase the dependability and long life accuracy that the Utility Industry has a right to expect from the watthour meters they buy.

The full story of this new development is told in Sangamo Bulletin 201. Write for copies today.

Only Measured Facts are Known Facts

SANGAMO
ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

Sangamo J Meters have proved their ability to meet today's requirements and tomorrow's anticipated loads with sustained accuracy, economy of maintenance and troublefree performance.



SM52-13

SPANGLEAM —an all new product, inside and outside!

Inside: Wire pulling easier than ever with the new smoother, protective coating of resinous lacquer compounded with Zirconium. Corrosion resistance *plus* assured grounding.

Outside: Electrogalvanized exterior specially processed for this smart, new finish. Where conduit must be installed in exposed locations, SPANGLEAM presents a neat, attractive appearance. SPANGLEAM is highly resistant to smudge, abrasion and corrosion.

SPANGLEAM —tops in the field!

- easier to cut
- easier to bend
- faster to install
- cleaner
- lightweight
- strong
- permanent

SPANGLEAM —available immediately in the full range of six sizes:

½", ¾", 1", 1¼", 1½", and 2" O.D.

Find out how SPANGLEAM can help you—

- give you a better installation
- make your work easier
- build profits

See your distributor . . . he has SPANGLEAM *in stock.*

SPANG CONDUIT

SPANG-CHALFANT
Division of The National Supply Company
GENERAL SALES OFFICE:
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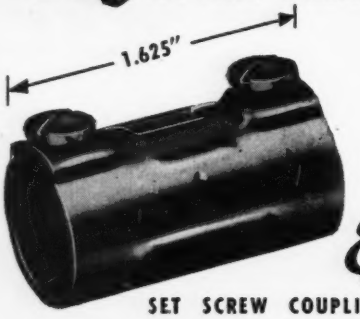
NEWLY DESIGNED Efcor SET SCREW FITTINGS FOR E. M. T. SAVE HOURS OF INSTALLATION TIME ...GIVE LASTING GRIP

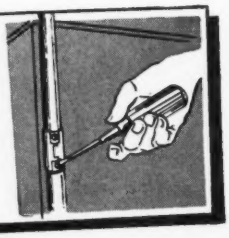
SET SCREW CONNECTOR #2750

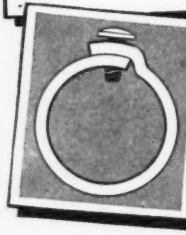


SET SCREW COUPLING #2760

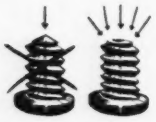
These new EFCOR Set Screw Connectors and Couplings make possible amazing labor and material cost savings in non water-tight installations. One turn of set screw locks the E.M.T. firmly into place.

NO SPECIAL TOOLS NEEDED —Installations which are inaccessible with an open end wrench are now quickly, easily accessible with an ordinary screwdriver!





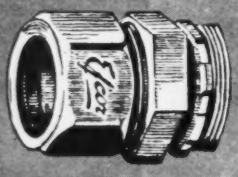
STRIPPING OF SCREW THREADS IS ELIMINATED— Overlapping of steel in the construction of the body doubles the length of the screw thread.



⊖ DENOTES BINDING SURFACE

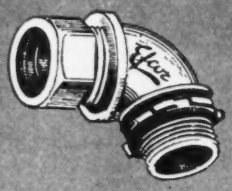
EFCOR CASE HARDENED CUP SCREWS LOCK TUBING MORE SECURELY THAN CONVENTIONAL POINTED SCREWS BECAUSE THEY BIND A GREATER SURFACE AREA OF TUBING.

FOR WATERTIGHT INSTALLATIONS USE EFCOR COMPRESSION TYPE E. M. T. FITTINGS

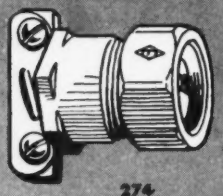


Cat. No. 750-755
Size ½"-2"

760-765
½"-2"



770-772
½"-1"



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⅜" Greenfield to ½" E.M.T.

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WOODSIDE 77, NEW YORK

SOLD THROUGH WHOLESALERS ONLY

F. R. "MAC" McVICKER OF ST. LOUIS

welcomes the friendly "SHOW ME" attitude of utility folks he calls upon in Missouri and neighboring states of Indiana, Illinois and Arkansas. "My utility friends always give me a good chance to talk up the many good points of Locke insulators," reports "Mac", "but sooner or later they say 'SHOW ME' proof of what you say. This, of course, gives me a fine opportunity to show some of the wonderful service records established by Locke insulators in this area, as well as in other sections of the country. These service records always impress because they're so outstanding. Service records like these are another one of many good reasons why leading utilities put their confidence in Locke insulators."

In St. Louis, "Mac" McVicker says —

"UNION ELECTRIC COMPANY OF MISSOURI SERVICE RECORDS REVEAL WHY LEADING UTILITIES PUT THEIR CONFIDENCE IN

LOCKE SWITCH INSULATORS"

"After 26 years continuous service in an industrial area, LOCKE SWITCH INSULATORS good enough for re-use on Union Electric 138 KV basic power loop."

reports "Mac" McVicker

"In 1951," says "Mac", "Union Electric tore down a 69 KV sub-station at Cahokia, Missouri, a congested industrial area.

"This sub-station had been built in 1926 using some 265 Locke Switch Insulators. Union Electric intended to junk all unusable equipment, since a new 138 KV sub-station was to be erected on the site. However, engineers noted that even after 26 years of continuous, uninterrupted service, the 265 Locke Switch Insulators appeared to be in excellent condition. These insulators were cleaned, high-potted and power-factor tested and the major portion of them are now being used on the new Clark 138 KV sub-station. The remainder were used in the construction of 138 KV arrester bases and for building 138 KV switches for other parts of the Union Electric system. Certainly," says "Mac", "here's another good example why leading utilities place their confidence in Locke Switch Insulators."

On next page "Mac" McVicker tells why Locke Switch Insulators often give you more than your money's worth.... →

"Mac" McVicker tells why **Locke Switch Insulators** survive and prosper in industrial area served by Union Electric Company of Missouri—

1. "Most important," says "Mac", "is protection of metal parts. Locke Permazinc galvanizing . . . a quality-controlled, double hot-dip method . . . assures the high degree of resistance required to survive industrial atmospheres.

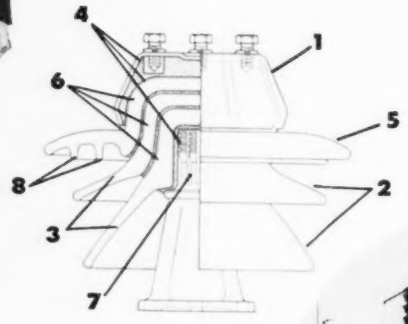
2. "Note the uniformly smooth glazed surfaces which assure easy natural cleaning by wind and rain, and aid the insulator in maintaining its original excellent electrical characteristics."

3. "The Locke wet-process porcelain body . . . the toughest known by Locke . . . has been a standard of comparison since 1893," explains "Mac". "For this reason, Locke Switch Insulators easily survive power arcs, lightning flashovers, and rough handling."

4. "Mac" points out that "the non-hardening, resilient coatings, applied to all unsanded, load-carrying surfaces, distribute loading efficiently and act as expansion joints under temperature changes. This contributes to longer life.

5. "Compression glaze . . . a Locke development . . . increases impact strength and eliminates craze to assure lasting smooth surfaces for easy natural cleaning."

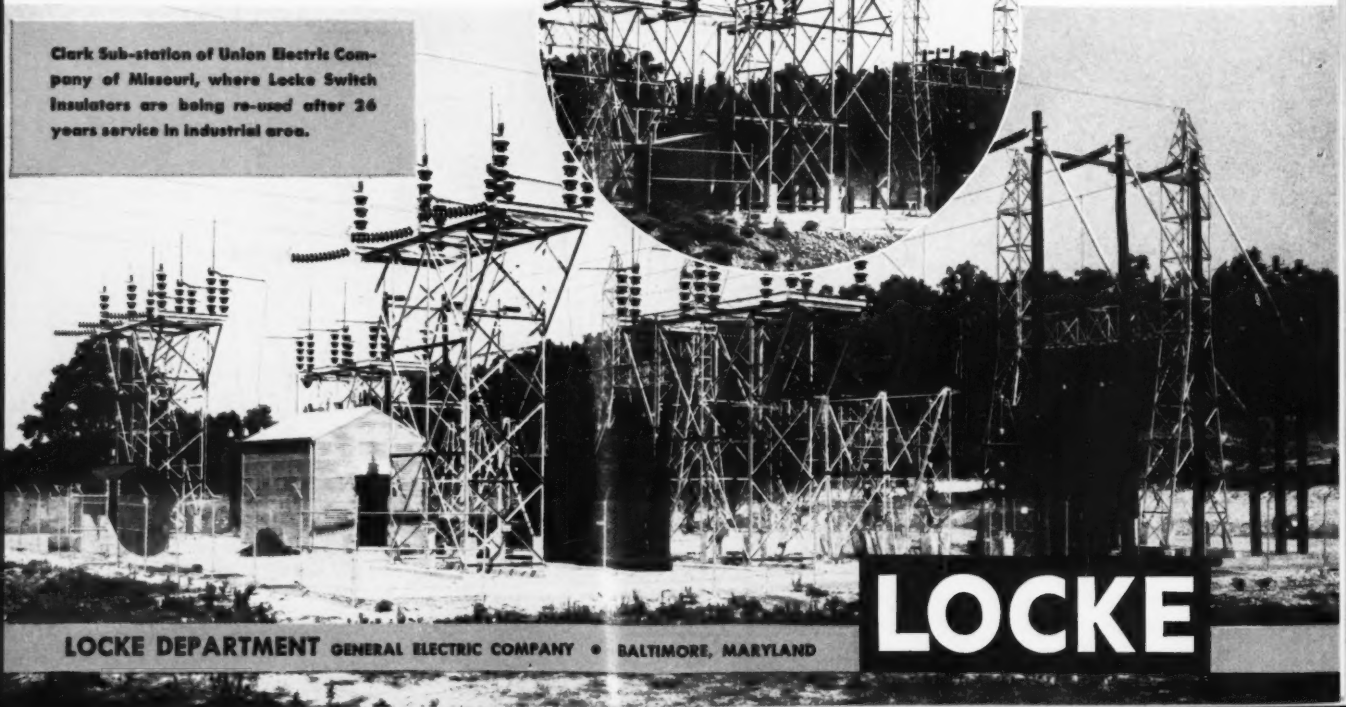
6. "Locke compression sand at the cement joints integrates the multiple shells into a permanent, high strength unit. No loose joints . . . no cracked shells," explains "Mac".



7. "The feature of vertical ribs on the inside of the caps and the outside of the pins provides high torsional strengths," adds "Mac".

8. "The contours of the corrugations," says "Mac", "have been developed to give maximum resistance to mechanical impact. Their depth assures full leakage distance."

"Specify Locke Switch Insulators by catalog number," suggests "Mac". "They're built to last!"



Clark Sub-station of Union Electric Company of Missouri, where Locke Switch Insulators are being re-used after 26 years service in industrial area.

LOCKE DEPARTMENT GENERAL ELECTRIC COMPANY • BALTIMORE, MARYLAND

LOCKE

High in Profit... low-cost electrical radiant heating

U.S. Rubber's USKON® ceiling panels put you in the heating business

What does USKON mean to the Electrical Contractor?

FIRST, it can be quickly and easily installed—the panels *now* can be applied in sheet form to existing ceilings. No extensive wiring or alterations needed. A minimum of trouble and time for you. It keeps your costs down.

SECOND, Uskon is a proven seller. With Uskon the homeowner knows he can heat his house as it grows; when he wants to finish expansion attic, he merely orders some more Uskon panels from you. This is truly the heating system that fits everybody's needs and offers you repeat business.

THIRD, Uskon is a product of United States Rubber Company. It has been tried and proved for several years with complete success in homes, apartments, offices, expansion attics, commercial and industrial buildings, bathrooms, sun porches, game rooms, garages, basements, motels, summer cottages. Uskon has revolutionized electrical radiant heating!

Everybody wants USKON electrical radiant heating! Architects like the freedom of design it gives them—no radiators, furnaces, pipes, ducts, and so on. Decorators like Uskon for the same reason, plus the fact that it can be painted over with any ordinary flat paint.

Home Owners prefer Uskon because it costs less to install than almost any other kind of heating—and because it gives quick heat with a switch or thermostat. Uskon can be installed in one room or in all rooms; completely eliminates every kind of nuisance found in ordinary heating systems. Approved by Underwriters' Laboratories, Inc.

As an electrical contractor, you will find Uskon electrical radiant heating to be one of your most profitable items. It is made by United States Rubber Company, a great name known for quality products everywhere—a name that helps you sell. For complete technical data and cost information write for Catalog M3177, Mechanical Goods Division, United States Rubber Company, Rockefeller Center, New York 20, N. Y.

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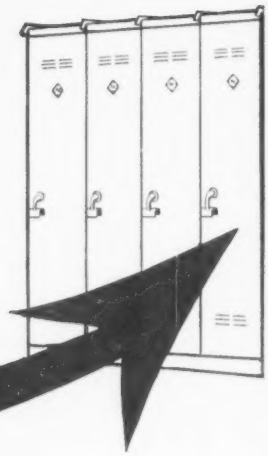
MECHANICAL GOODS DIVISION—ROCKEFELLER CENTER, NEW YORK 20, N. Y.

It's Easy to Add Feeders

ON AN ALLIS-CHALMERS UNIT SUB

When System Growth
Demands Additional Substations,
Install Allis-Chalmers Unit Subs.
They are Simple to Specify,
Time-Saving to Install and Easy to Expand
for Future Needs.



WHEN LOAD GROWTH MEANS EXPANSION . . . add substations designed to do more than just meet your immediate needs — add Allis-Chalmers Unit Substations with built-in flexibility for the future.

Then when future residential or industrial growth necessitates additional feeders, they will be easy to add. Each feeder of an Allis-Chalmers Substation is a complete unit in itself and is easy to install.

Here's How Feeders Are Added

Remove the bolted-on plates that cover the pre-cut bus and wiring openings . . . also remove the roof splice plate from the end feeder. Now bring the new feeder into position. You'll find correct alignment is easy, insured by jig-built construction. Replacing the gasketed roof-splicing plate completes mechanical connections.

Electrical connections are also simple to make. The predrilled, silver-plated bus extensions are bolted together. Easy-to-apply no-corona tape and insulating tape finish the joint. There's no compound to melt, chip, scrape, or crack. Control wiring is easy to connect because terminal blocks are grouped . . . located for ready access.

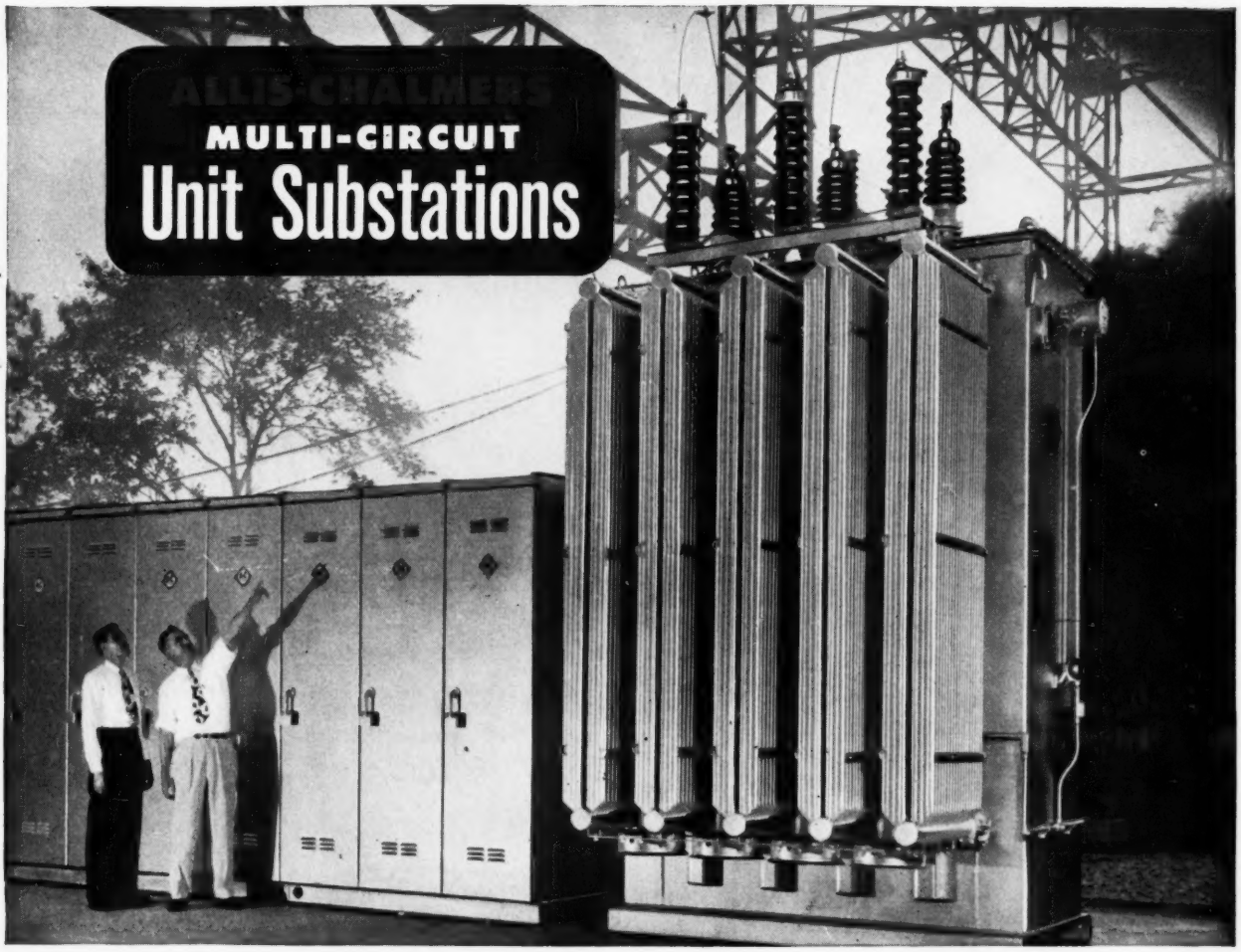
That's it! Connect feeder cables and the job is done.

MCS Unit Substations are a convenient answer to the growing distribution problem . . . to the ever increasing demand for power and yet more power. They are simple to specify, neat and modern in appearance, easy to expand, and they save you money these five ways:

(1) Original equipment cost is low; (2) compact construction reduces space requirements and real estate costs; (3) pre-wired unit design speeds installation; (4) maintenance is quick and economical because of improved accessibility, and (5) you purchase only the feeders you need *now*, deferring additional expenses until load growth demands them.

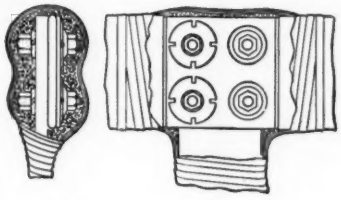
For the full story on what Allis-Chalmers Unit Substations can mean in your distribution system, call your nearby A-C representative, or write to Allis-Chalmers, Milwaukee 1, Wisconsin. A-3544

ALLIS-

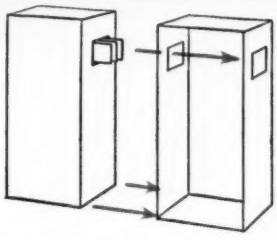


Here's Why Feeders are Easy to Add...

1 **FEEDER UNITS** are jig-built so that each feeder cubicle is exactly like every other one. Bus extension openings, control wiring openings . . . even small screw holes . . . are pre-cut in jigs. This careful, uniform construction makes field assembly easy. Just move the new feeders into position. Alignment is perfect.



2 **BUS JOINTS** are easy-to-make in the field. Bus extensions are pre-drilled and silver-plated . . . designed for quick, easy bolting together. No-corona tape covers the bolted joint . . . speeds the job by providing a smooth taping surface. Insulating tape finishes the joint. There's no compound to melt or apply.



3 **EACH FEEDER** is an individual unit . . . complete with two side panels, roof and floor. All enclosed parts are protected from the weather, dust or mechanical injury even during the last minutes of installation. Gasketed roof-splicing pieces fit easily into place forming a weatherproof seal.

CHALMERS

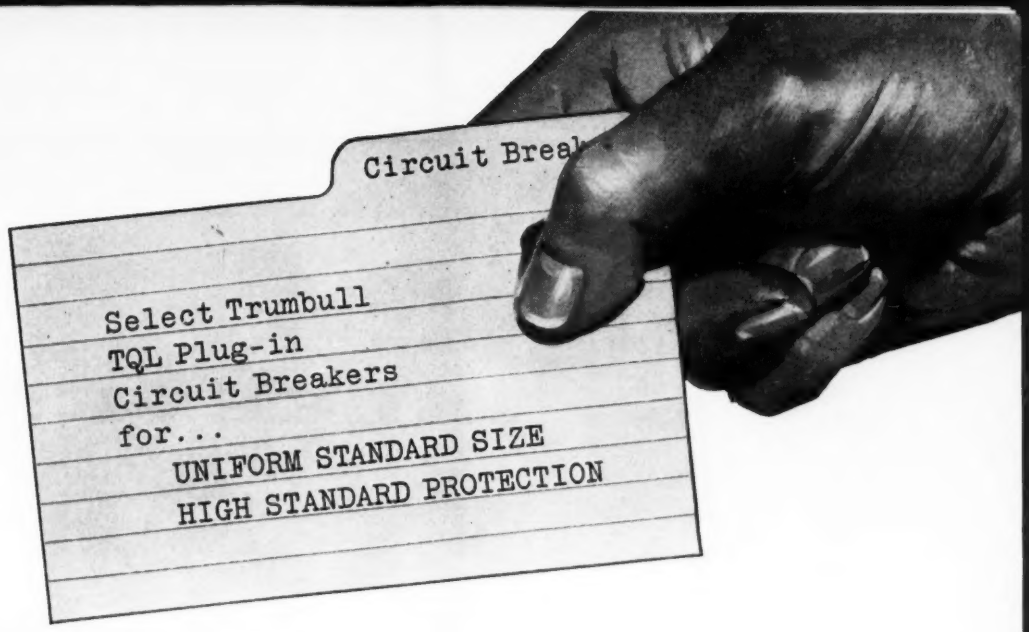
A-C ALLIS-CHALMERS

FRANCIS TURBINES

SUPPLYING a fundamental need in the field of hydraulics, the Smith-Francis Turbine has been in the forefront of the industry for many years. It is ideal for that long range of heads existing between the lower medium and very high. Completely described in a new Bulletin No. 152—just off the press! Write for your copy NOW!

S. MORGAN SMITH CO., YORK, PENNA.

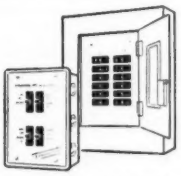
POWER *by* SMITH



Trumbull TQL Plug-in Breakers from 10 through 50 amp. ratings are all made to the same standard dimensions — physically interchangeable not only in Trumbull Load Centers and Panelboards but also dimensions of these breakers have been adopted by leading manufacturers. This means convenience, economy and time saving for the contractor or plant electrician.

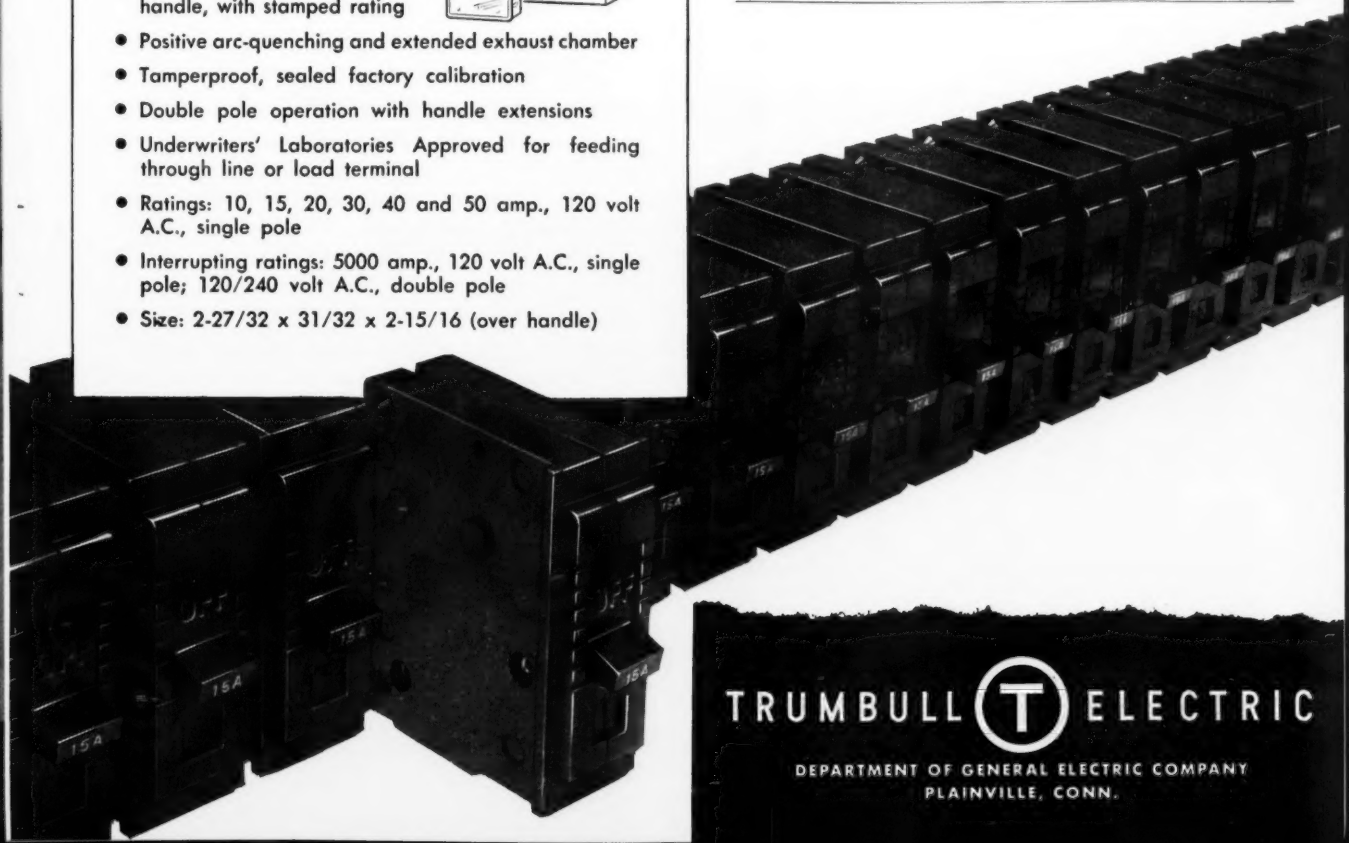
Trumbull also sets the quality and safety standard with a thermal-magnetic trip for positive protection against both shorts and sustained overloads. Compact and economical to buy and install. They pay for themselves because they are built to last a lifetime. They pay big dividends in letting you restore service quickly after short or overload is corrected. They may well save a capital investment by prevention of overheated circuits.

Quick Facts



- Quick-make, Quick-break
- Trip indicating, trip free handle, with stamped rating
- Positive arc-quenching and extended exhaust chamber
- Tamperproof, sealed factory calibration
- Double pole operation with handle extensions
- Underwriters' Laboratories Approved for feeding through line or load terminal
- Ratings: 10, 15, 20, 30, 40 and 50 amp., 120 volt A.C., single pole
- Interrupting ratings: 5000 amp., 120 volt A.C., single pole; 120/240 volt A.C., double pole
- Size: 2-27/32 x 31/32 x 2-15/16 (over handle)

Leading Electrical Distributors everywhere stock Trumbull equipment. See your local Trumbull Distributor for top values and alert service. For complete descriptive literature, write for TEB-12.



TRUMBULL (T) ELECTRIC

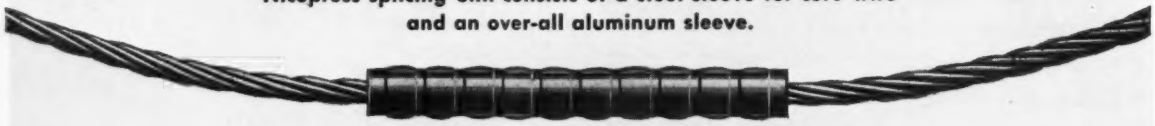
DEPARTMENT OF GENERAL ELECTRIC COMPANY
PLAINVILLE, CONN.

Nicopress SLEEVES for A·C·S·R·

WILL GIVE YOU PEAK PERFORMANCE!

COMPLETED LINE SPLICE

Nicopress splicing unit consists of a steel sleeve for core wire and an over-all aluminum sleeve.



COMPLETED JUMPER SPLICE

REPAIR SLEEVE
(Partially Completed)

Nicopress is the Registered Trade Mark of The National Telephone Supply Company

The National Telephone Supply Company

5100 SUPERIOR AVENUE • CLEVELAND 3, OHIO

Canadian Mfr.—N. SLATER CO., LTD., HAMILTON, ONT., CANADA

Export Distributor—INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

THE NATIONAL TELEPHONE SUPPLY COMPANY

FREE booklet

answers 17 most frequently-asked questions about this label on industrial lighting units, such as:

Q What do the initials RLM stand for?

A The "R" stands for Reflector, the "L" for Lighting equipment and the "M" for Manufacturers—*Reflector* and *Lighting Equipment Manufacturers.*

Q How does the RLM Label assure conformance to RLM Standards?

A Representatives of the Electrical Testing Laboratories periodically visit the plants of all manufacturers participating in the RLM Specification-Certification Program. These ETL inspectors are authorized to take lighting units right off the assembly line or out of stock at random and make the required tests. They may also obtain test samples direct from distributors' stocks in order to check conformance to RLM minimum standards.

Q Who are the Electrical Testing Laboratories?

A Electrical Testing Laboratories, Inc., 2 East End Ave., New York 21, N. Y., is an independent testing organization which has conspicuously served industry for over 50 years. With this impartial and scientific organization rests the sole responsibility of determining whether or not an industrial lighting unit measures up to every individual quality standard that qualifies it to bear the RLM Label.

Q What are the 4 Basic Tests made by Electrical Testing Laboratories?

A (1) Quality of reflecting surface, (2) Reflection factor, (3) Shielding angle and reflector dimensions, and (4) Photometric test for light distribution and efficiency.

Q What does the RLM Label stand for?

A The label affixed to a lighting unit certifies that the reflector meets the minimum specification and performance standards, determined and established by the RLM Standards Institute.

Q Who sponsors the RLM Standards Institute?

A Incorporated as a non-profit organization, the Institute is sponsored by 28 manufacturers who voluntarily elect to manufacture industrial lighting equipment in accordance with RLM Standard Specifications.

Q How are RLM Standard Specifications established?

A The RLM Technical Committee, with the counsel of outstanding illuminating engineers, continuously reviews present specifications and suggests improvements and prepares new specifications. The Committee's recommendations then are reviewed by the Board of Trustees and finally submitted to the Institute Members for ratification. The adoption of new specifications requires approval by at least 80% of the membership.

Q In addition to design and construction features that meet certain minimum standards, what else does the RLM Label assure the buyer?

A It provides the buyer with a warranty of uniform quality. In addition to the periodical inspections and tests made by the Electrical Testing Laboratories, the manufacturer warrants that every unit shipped by him meets the published specifications of the Institute.

Q How many different types and sizes of RLM Units are there?

A There are 18 basic types of RLM Units made by one or more of the 28 member-manufacturers. At present there is available a total of over 320 different makes and types of units which either bear the RLM Label or are on submittal for testing and certification at Electrical Testing Laboratories.

Q How may I obtain free copies of all existing RLM Specifications and a check list of RLM-Member Manufacturers?

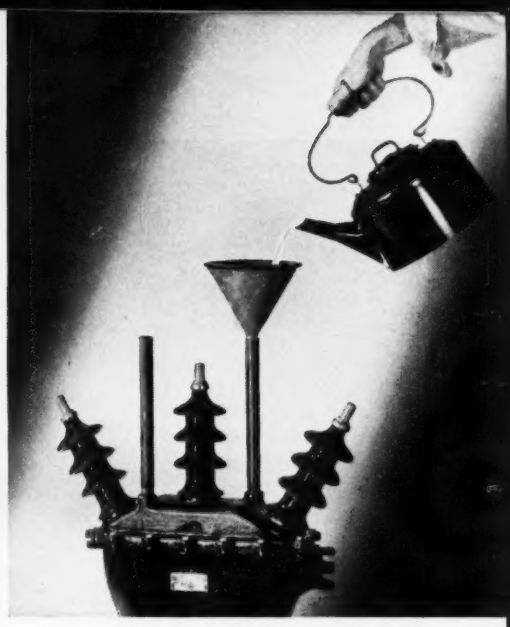
A Send for the 48-page RLM Specifications Book and the new Question and Answer booklet. Write RLM Standards Institute, Suite 815, 326 W. Madison St., Chicago 6, Ill. Your copies will be mailed without cost or obligation.

RLM STANDARDS INSTITUTE
INCORPORATED
The letters RLM stand for Reflector and Lighting Equipment Manufacturers

R3370RR

Thousands of AnacondA Potheads—like the one in center of this specially posed photograph—are available from relatively few, readily-interchangeable components. A wider variety than ever before—yet stockroom parts inventory is actually less. To fill *all* your pothead specifications, you need fewer parts.

A neater and better job can be obtained by using an AnacondA Jointing Kit. These unit packages of jointing materials contain all necessary materials to make one complete joint on a specific size and type of cable. An AnacondA Jointing Kit eliminates the possibility of inadequate materials . . . cuts down the need for large stocks.



Greater stability of AnacondA Insulating Compounds is based on extensive research for balanced compositions with proper physical and electrical characteristics for any installation.

ANACONDA CABLE ACCESSORIES

Service is better than ever on this complete line, designed by power-cable specialists for use with any make of cable. Expanded facilities keep pace with trend toward ordering cable and cable accessories together.

Anaconda's 20-year-old Cable Accessories Department is busier now than ever. In new and expanded quarters it is turning out greatly increased quantities of potheads, jointing kits, insulating compounds and paints. Back of this activity lies a story of increased demand by utilities, railroads, industrials, and equipment manufacturers for cable accessories that are engineered by power-cable specialists. Here, old and new customers have found the consistent quality, good engineering, ease of installation and low cost of maintenance traditional with Anaconda for years.

ANACONDA Potheads spearhead the line. Available in such types as capnut, switchgear, transformer, disconnect, and through types, they feature an interchangeability of parts equalled nowhere else.

More than 2000 different pothead assemblies can be furnished from standard parts for any particular conductor size and voltage rating in the multi-conductor capnut type alone!

Another popular item is the ANACONDA Unit Package of Jointing Material. In one package (see illustration) is everything needed to make a complete joint on a specific size and type of cable. The kit saves time, simplifies ordering, minimizes the need for storeroom stocks, and helps assure installation of a joint engineered for the particular application.

To keep pace with the increasing demand for ANACONDA Accessories, it has been necessary again to greatly increase the facilities of the Cable Accessories Department. This Department is now in a position to promise prompt shipment on most of your orders. Call your Anaconda Representative. He is always ready to help you with your cable and accessories problems. 52460

Accessories for all types and sizes of bare and insulated conductors.

ANACONDA®

ANACONDA ON THE PACIFIC COAST: Plant at: Orange, Calif. District Offices at: Los Angeles, Calif.; San Francisco, Calif.; Seattle, Wash.

Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

Gentlemen:
I'm interested in AnacondA Cable Accessories.

- ☐ Have your representative call.
- ☐ Send me your 100-page Pothead and Terminal Catalog.
- ☐ Send me your Jointing Material Catalog.
- ☐ Send me *complete* Cable Accessories Catalog.

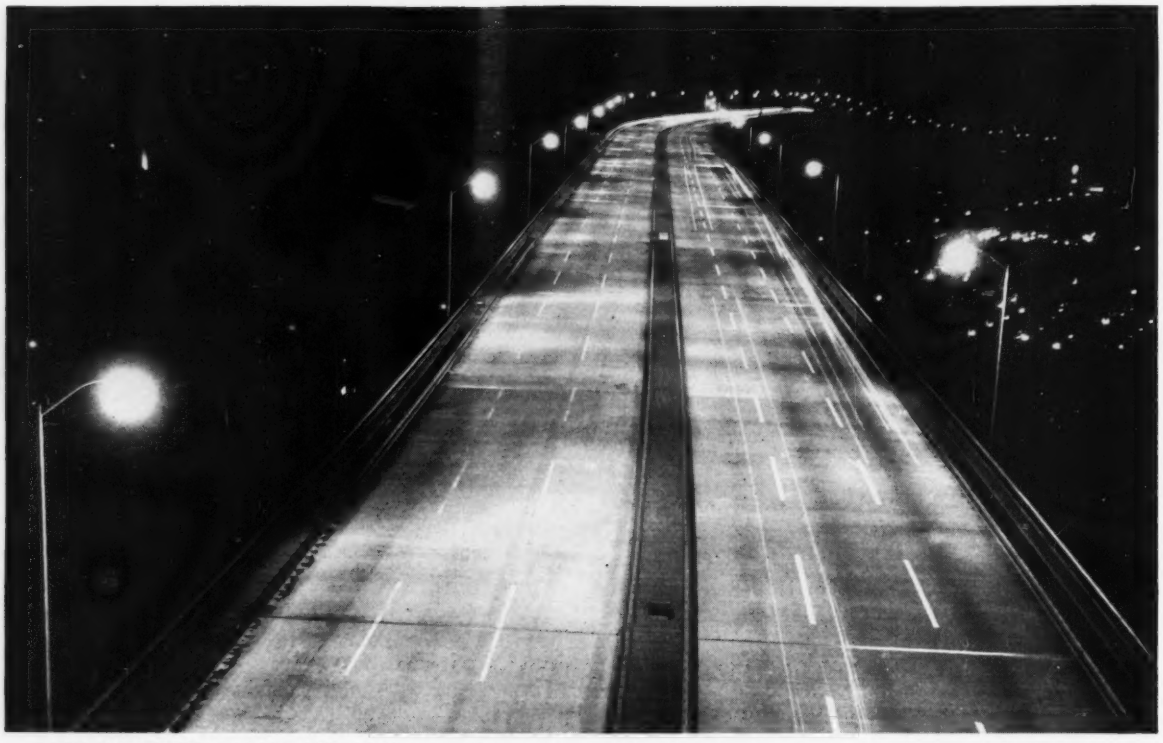
NAME .....

COMPANY .....

TITLE .....

ADDRESS .....

CITY ..... STATE .....



BOTH HIGH-SPEED SAFETY AND LOW MAINTENANCE COST MADE POSSIBLE WITH G-E FORM 109 LUMINAIRES.

Safe speed with G-E Form 109's on two New Jersey Turnpike bridges

G-E FORM 109 features rectangular pattern, uses mercury or filament, gives economical mercury-lamp operation with magnetic coil.

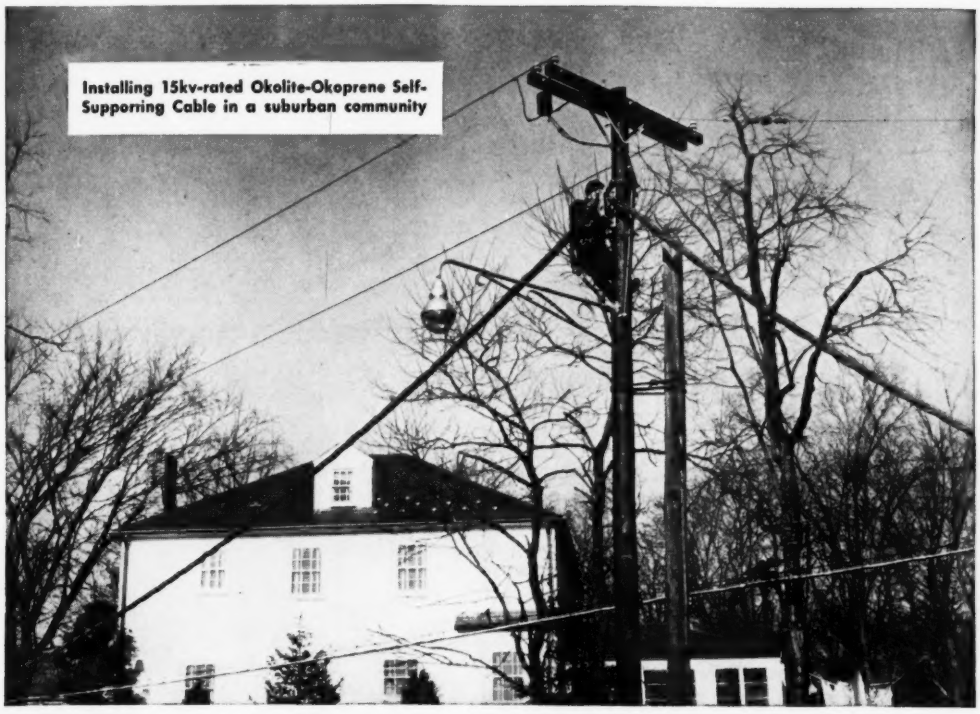
NO NIGHT FATALITY has occurred on the two New Jersey Turnpike bridges illuminated by G-E Form 109 Luminaires, despite heavy traffic averaging 84,000 vehicles during every 24-hour period. The Form 109's make safe, high-speed driving possible where the New Jersey Turnpike bridges the Hackensack and Passaic Rivers, and warn motorists of the change from the usual straight-away travel.

USE FILAMENT LAMPS. Average intensity of 0.6 footcandles on the concrete roadway is provided by 133 G-E Form 109's equipped with 10,000-lumen, 20-ampere filament lamps, at a mounting height of 30 feet to light center, with 100-foot staggered spacing. Poles are isolated from the road area with a special bracket mount which mounts them over the side of the bridge structure.

LOW MAINTENANCE. The G-E Form 109 luminaire gives you the flexibility of using either mercury or filament lamps, the economy of G-E standardization, and extremely high light utilization. You are assured of minimum maintenance cost with quick, easy relamping and low glassware breakage. For information, ask your G-E representative for Bulletin GEA-5419. Or write Section 452-135, General Electric Company, Schenectady 5, New York.

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.



Installing 15kv-rated Okolite-Okoprene Self-Supporting Cable in a suburban community

at 5 kv or 15 kv-

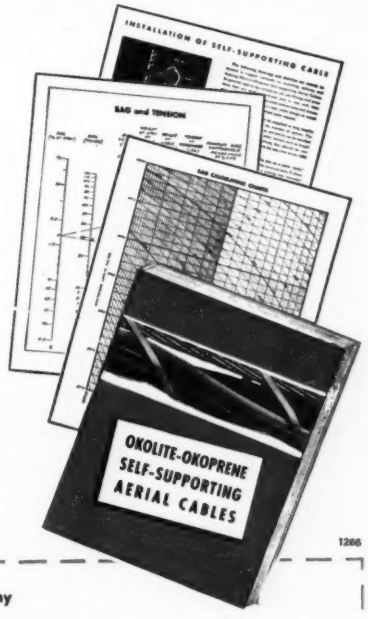
YOU CAN REDUCE TREE TRIMMING, ELIMINATE HIGH POLES

Whether or not to raise distribution from 5kv to 15kv level is a problem being posed by ever-increasing residential growth. If the cost of tree-trimming or overbuilding with high poles is your principal obstacle, consider the proved advantages of Okolite-Okoprene Self-Supporting Cable.

Okolite-Okoprene has an extraordinary record of reliability in both low and high voltage service, is surprisingly economical when *all* costs are considered. In some instances, it costs no more than open wiring. Its maintenance cost is negligible . . . service interruptions and outages are cut to the bone.

If you are faced with extensions or changes in your overhead system in congested or shade-tree areas, we suggest you first explore the possibilities of Okolite-Okoprene. Available in standard aerial cable constructions, as well as in "Dualay," the patented assembly that can readily be tapped hot.

Bulletin WE-1058 gives 52 pages of information on how to choose, design and install aerial cable circuits. Fill out the convenient coupon and mail it today to this address: The Okonite Company, Passaic, N. J.



1266

The best cable is your best policy

OKONITE

insulated wires and cables

The Okonite Company
Passaic, N. J.

Please send me Bulletin WE-1058 on Self-Supporting Aerial Cables.

Name.....

Company.....

Address.....

City..... State.....

Super-Speed

20-20-20-Cycle Repetitive Reclosing in a 3-Cycle Production-Built Breaker

HERE'S THE FIRST BREAKER with both full mechanical trip-free pneumatic operation and super-speed repetitive reclosing.

Key features of this faster and more powerful operating mechanism are:

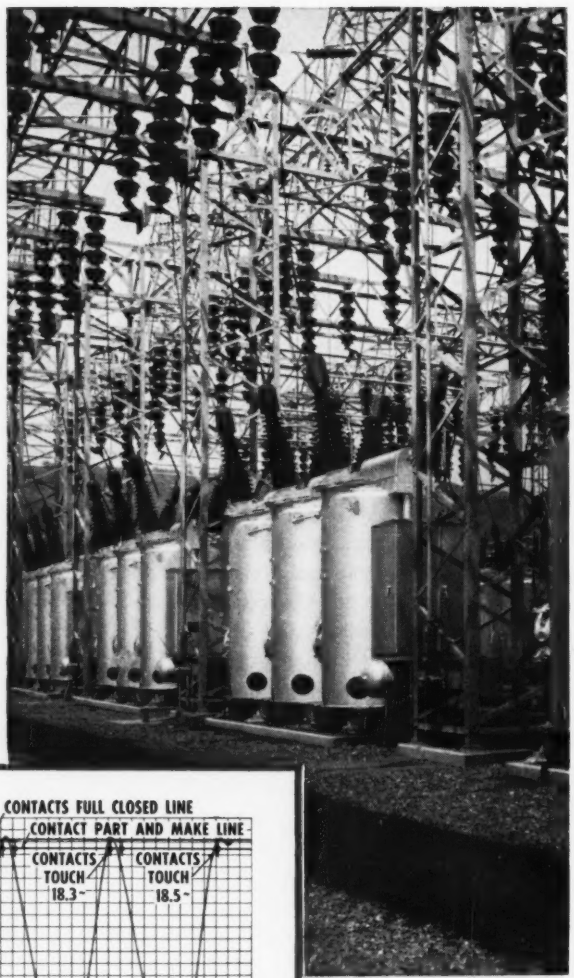
- Low energy—sure acting tripping mechanism.
- Simple conventional control circuit with single trip coil — breaker *always* opens mechanically trip-free.
- An instantaneous air dumping system on the closing cylinder allows ultra-fast recoupling for "20-20-20" repetitive reclosing.

15 YEARS' FIELD EXPERIENCE BACKS DESIGN

This design is the result of research plus experience gained on thousands of units since 1937 when Allis-Chalmers originated the mechanically trip-free pneumatic operator.

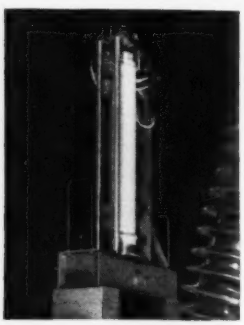
For more information about Allis-Chalmers power oil circuit breakers call your nearby A-C district office, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3928

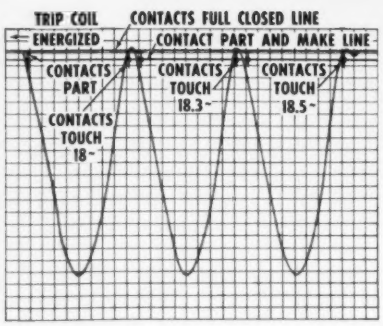


Recent installation of BZO-160 power oil circuit breakers with super-speed mechanically trip-free pneumatic operators.

Tests Prove High Speed Action of Breaker



Speed recording device

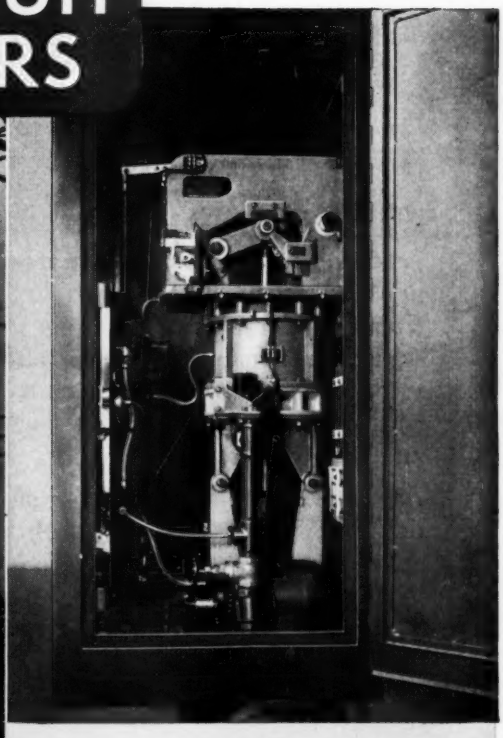


Typical speedgraph from production breaker shows high speed repetitive reclosing.

Operation!

ALLIS-CHALMERS

Power OIL CIRCUIT BREAKERS



Super-speed Operator for 3-cycle breakers. Mechanically trip-free mechanism above closing cylinder, extra large exhaust and maintenance closing device below, accessible from either side or front.

Type BZO-160 . . . 3 and 5 cycle. Ratings in production up to 230 kv, up to 10,000,000 kva i.c.

A-C ALLIS CHALMERS

ALLIS-CHALMERS

Originators of Full Mechanical Trip-Free Pneumatic Operators.

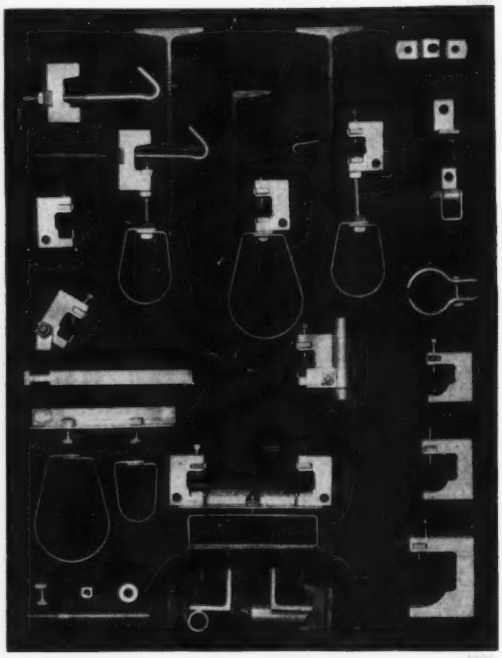
When Installing Conduit...

You can do a

Better Job Quicker

WITH . . .

STEEL CITY-KINDORF CLAMPS and HANGERS

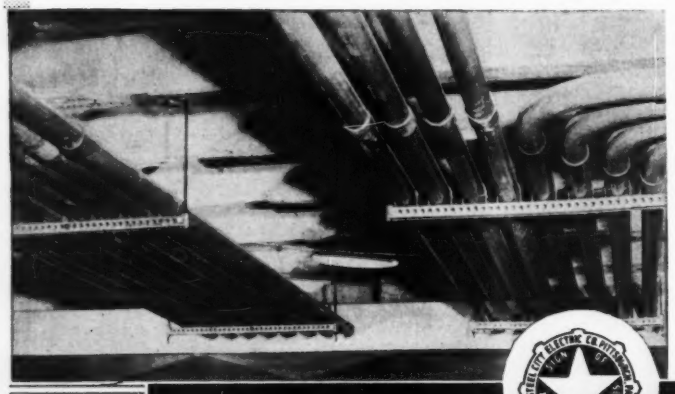


With these clamps and hangers you can suspend single runs of conduit from beams, channels and angles of structural steel as well as from wood beams and ceiling. The strong steel clamps enable you to install conduit at right angles to a beam, parallel to a beam or perpendicular to a beam. They will enable you to install single runs of conduit in an easy, low-cost manner with a neat workmanlike appearance.

All items needed in hanging or supporting single runs of conduit are pictured and described in Catalog B-3, which will be mailed upon request.

. . . and for Multiple Runs of Conduit

. . . regardless of how complex the installation may be, you will find the needed hangers and supports listed—complete with illustrations and application data — in Catalog K-11, which will also be mailed upon request.



West Coast Representatives

MURPHY-HAIN COMPANY
720 E. Second Street
LOS ANGELES 12, CALIF.

HODGES & GLOMB
1264 Folsom Street
SAN FRANCISCO 3, CALIF.

NORTHWESTERN AGENCIES
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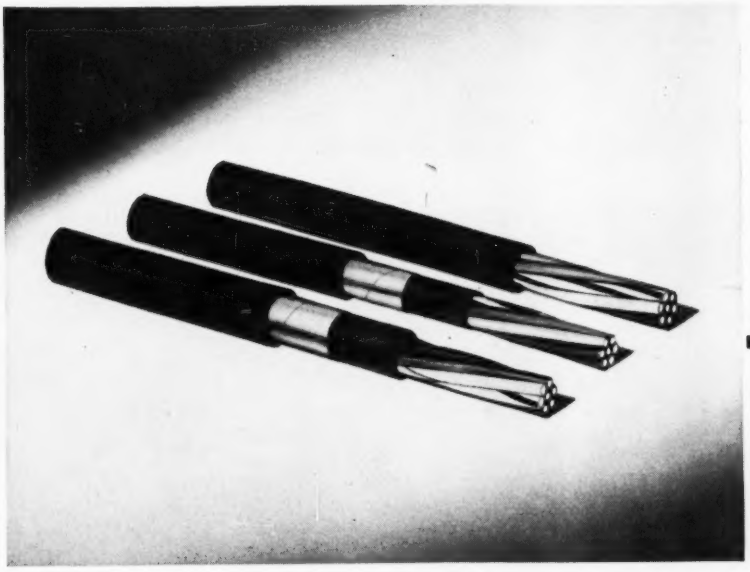
STEEL CITY ELECTRIC CO.

OUTLET BOXES AND COVERS
SWITCH AND FLOOR BOXES
JUNCTION BOXES, CONDUIT FITTINGS AND KINDORF DEVICES

PITTSBURGH 33, PA.



THESE THREE ARE "A NATURAL"

for LOW COST, TROUBLE-FREE OPERATION of SIGNAL, CONTROL and COMMUNICATION CIRCUITS

Here's a list of the top quality benefits you get when you buy Simplex Polyethylene-Plastex Signal Cables. For more complete information send for our newly-revised Simplex catalog #1010 in care of the address below.

POLYETHYLENE INSULATION

- High Dielectric Strength
- Low Dielectric Constant
- Low Power Factor
- High Insulation Resistance
- Good Physical Properties
- Low Water Absorption
- Resists Oils, Chemicals, Sunlight, Aging
- Low Cracking and Shattering Temperatures
- Resists Deformation
- Permits Use of a Thin Wall

PLASTEX JACKET

- Tough yet Flexible
- Low Cracking Temperature
- Wide Temperature Range
- Resists Abrasion, Oils, Chemicals, Flame, Sunlight, Aging
- Low Water Absorption and Diffusion

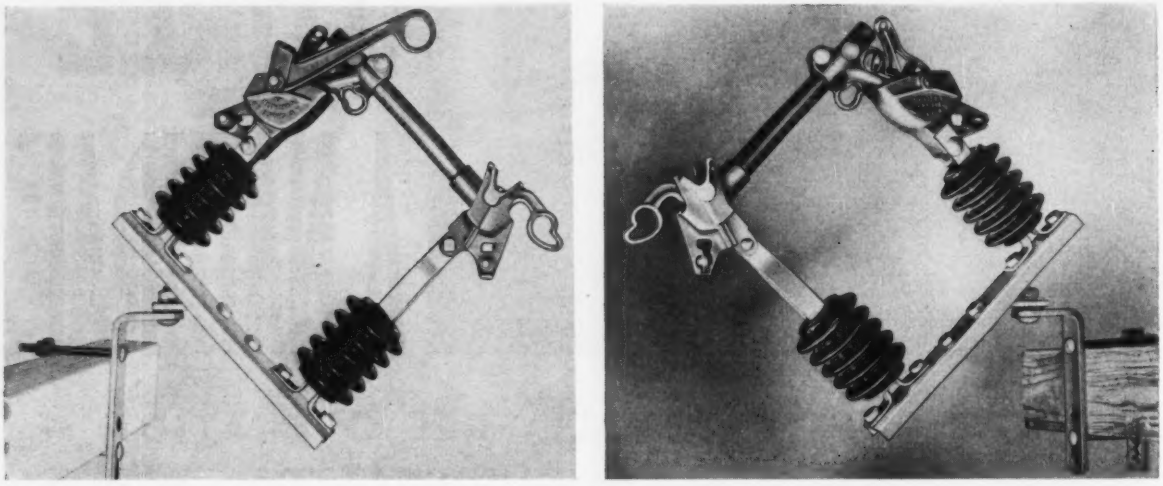
COMPLETED CABLE

- Small in Diameter
- Light Weight
- Low Capacitance and Attenuation
- Electrical and Mechanical Stability
- Comes in Three Types Shown Above for Duct, Underground and Aerial Service

Simplex - WIRES & CABLES

SIMPLEX WIRE & CABLE CO.
79 SIDNEY STREET,
CAMBRIDGE 39, MASS.

PRODUCT NEWS



KO-T double-insulator cutout is shown at left; on right is KO-TL double-insulator cutout with load break; meet NEMA standards

Cutout Has Twin Insulators

(1) A. B. Chance Co., Centralia, Mo.

The KO-T, featuring twin insulators, has been added to the Kick-Out cutout group and can be furnished with insulators that meet NEMA cutout standards or with 3 in. bolt circle NEMA insulators. It gives over-all protection from light overloads to heavy fault currents.

Because the kick-out action is mechanically time delayed, the link ejection is completed and the arc extinguished in the tube before contacts part, which prevents their pitting and burning, eliminates contact maintenance and reduces radio and TV interference.

According to the manufacturer, linemen can tell at a glance whether the cutout has been opened as a disconnect or by protective operation. If the fuse tube is hanging from the lower contact housing, the cutout has been opened manually. If it is hanging from the upper housing, the fuse link has been blown. Since the tube is suspended by the closed end when blown by fault, water cannot enter and damage the fuse tube fiber.

When the cutout is re-fused, the operator is protected by this safety feature: if the cutout is closed-in on a fault, all expulsive gases are directed away from the operator.

A load break lever, available as an optional accessory, permits the KO-T to be used to interrupt charging, magnetizing and load currents manually. By pulling the load break lever, the circuit is broken in the fuse tube in the same manner as when the fuse is blown by an overload or fault.

See Coupon on Page 56

For manufacturers' bulletins on these products, fill in and mail the coupon on page 56

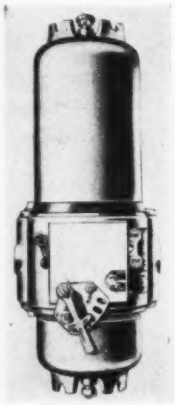
Indoor-Outdoor Current Transformers

(2) General Electric Co., Schenectady 5, N. Y.

With addition of an 800-amp unit, type JKP-0 butyl-molded transformers are available in ratings of 200:5; 400:5; 600:5; 800:5. The ratings are secured by passing the line conductor once through the window of the transformer; looping the primary conductor two or more times through the window provides additional ratings. The new 800-amp unit has a 150% continuous rating. These transformers come in both single-phase and 3-phase circuits. Installations may be made outdoors on poles and walls; indoors in boxes and on walls.

Explosion-Proof Motor Controls

(3) Crouse-Hinds Co., Syracuse 1, N. Y.



A new design in the type EPC explosion-proof line starter and circuit breaker Condulets, model M52, is said to have these new features: built-in push-button stations; built-in selector switches; additional back conduit entrance; additional horizontal through-feed conduit entrances; new and improved reset mechanism; neoprene gasket for protection of upper cover joint in most severe weather conditions; increased wiring space. It has the features of the original line including threaded joint construction, light weight, flexibility.

These Condulets are available for all sizes of line starters and combinations up to size 4 and for circuit breakers alone up to 600 amp. Details in bulletin 2634.

New OILTIGHT LIMIT SWITCHES

Here is a new line of remarkably compact Allen-Bradley limit switches . . . streamlined for fine appearance and built for millions of failure-free operations.

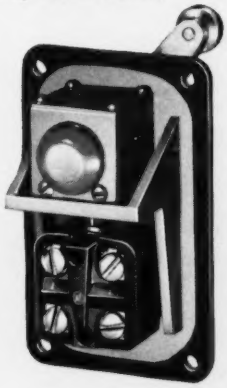
The operating heads of these limit switches may be attached to the switch body in four definite locations, each 90 degrees apart. A large selection of pushrods, lever arms, and other actuating mechanisms is available.

The name plate cover has a synthetic rubber gasket to exclude oil. Terminals are easily accessible by removing the cover plate. The body is threaded for ½" conduit. The switch mechanism is snap-acting, with one single pole normally open and one single pole normally closed contact, electrically separated.

The new Bulletin 802 limit switches are designed for machine tool applications. For further information send for a copy of Allen-Bradley Bulletin 802.

Bulletin 802 limit switch with roller lever

Roller lever type (Front View) for cavity mounting in machine frames



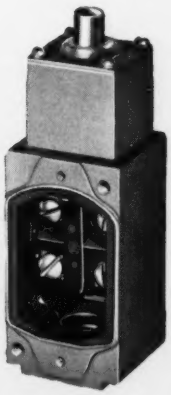
Roller lever type (Rear View) showing terminals for n.o. & n.c. contacts

ALLEN-BRADLEY QUALITY LIMIT SWITCHES

A-B Quality

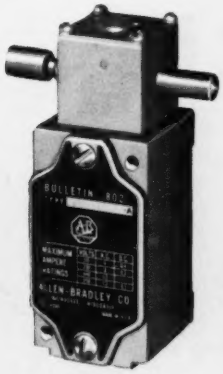
Allen-Bradley Co.
1316 S. Second St., Milwaukee 4, Wisconsin

Pushrod limit switch with roller for vertical motion of the pushrod

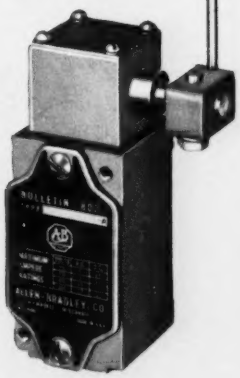


Pushrod limit switch without roller—cover off to show terminals

Pushrod limit switch designed for horizontal motion of the pushrod



Pushrod limit switch with side pushrod and maintained contacts



Lever operated limit switch with a long and flexible operating rod

1-53-MR

Extra! Handy Auxiliary Contacts

for all Allen-Bradley Sizes 0 and 1 Solenoid Controls

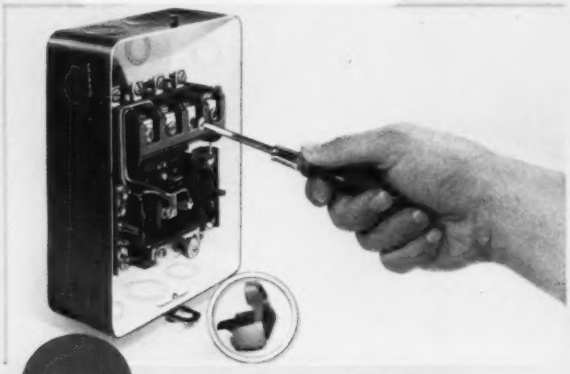
Contact may be reversed by removing one screw

Do you want to add one or more extra pilot contacts to some of your Allen-Bradley solenoid switches . . . to operate indicator lights, relays, or other starters?

These new, compact auxiliary contacts can now be added to the arc hood of any and all standard sizes 0 and 1 solenoid switches. The operating arm of the auxiliary contact is actuated by the up and down motion of the solenoid plunger of the switch to which it is attached.

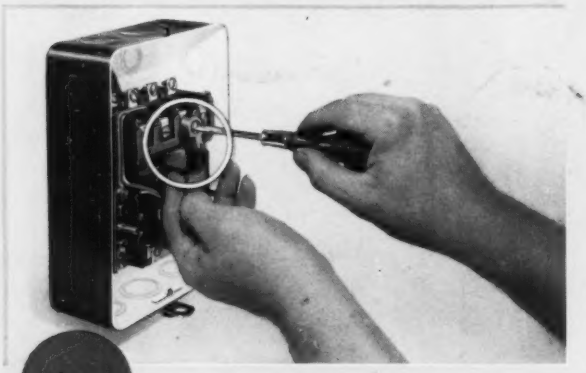
Write for descriptive literature.

SO SIMPLY APPLIED

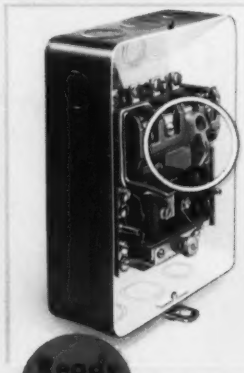


First Remove the terminal screw from the stationary contact block of the Allen-Bradley starter.

Second Insert terminal screw into mounting hole of auxiliary contact to be attached to starter.



Then Screw terminal screw into stationary contact block and fasten auxiliary contact to starter.



Ready to Wire Allen-Bradley auxiliary contact is now ready to be wired for any auxiliary pilot circuit.

Auxiliary Contacts easily changed from n.o. to n.c. operation

The new Allen-Bradley auxiliary contact may be instantly changed from n.o. to n.c. contacts. Removal of one screw permits the instant reversal of the contacts in the contact block. There are no small parts to lose.

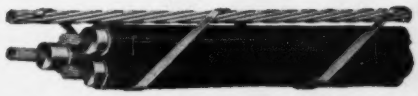
1-53-MR

These auxiliary contacts are available for all Allen-Bradley sizes 0 and 1 controls, including contactors, reversing switches, combination starters, Bulletin 709 solenoid starters, and Bulletin 609 manual starters.

Allen-Bradley Co., 1316 S. Second St.
Milwaukee 4, Wisconsin

ALLEN-BRADLEY
BULLETIN
SOLENOID CONTROLS

Reduce tree trimming costs with G-E Aerial Cable

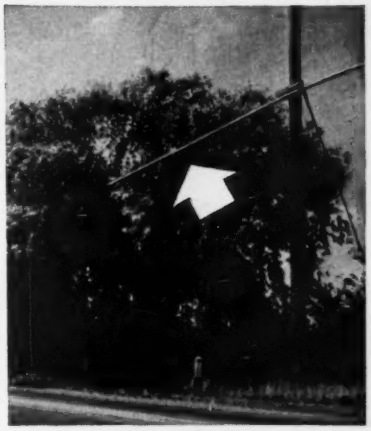


General Electric's Super Coronol* pre-assembled aerial cable fills the need for distribution circuits up to 15kv where appearance, safety, and service continuity are desired at a reasonable cost, and where underground construction is not warranted. Along tree-lined streets in particular, G-E aerial cable has been outstanding—average-sized limbs have no effect on its performance—the cost and ill-will resulting from tree trimming is largely eliminated.

The record of hundreds of installations shows that G-E aerial cable will stay in service when wind, snow, ice, and falling trees place open wire in trouble. In some cases, even where the pole plant was down, G-E pre-assembled aerial cable continued to operate satisfactorily for days while lying on the ground.

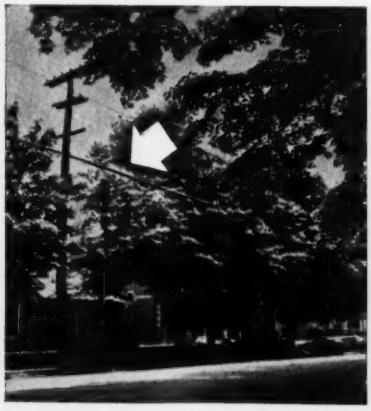
For more information see your General Electric wire and cable specialist. Or write Section W40-125, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

**Registered Trade-mark General Electric Company*



These willow trees in Eastern Massachusetts could have caused trouble when a new transmission line was installed. The power company avoided difficulty by using General Electric's 3-conductor, 1/0 Awg 15kv pre-assembled aerial cable—30,000 feet were used. Tree conditions were no problem.

This installation of G-E pre-assembled aerial cable is located in a wooded residential section. It is a 5kv cable and has given unfailing service in all kinds of weather for more than 10 years.

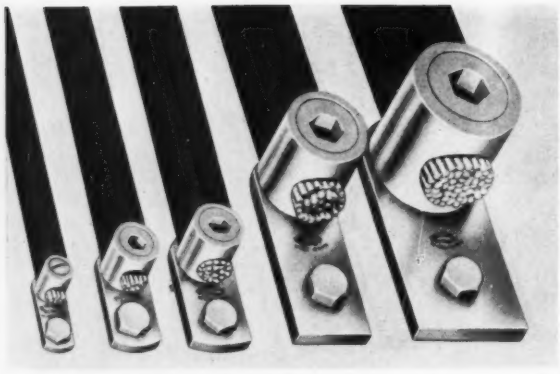


In this Massachusetts city the shortest route for a new transmission line was through the center of town. Yet customers' trees were not destroyed because G-E pre-assembled aerial cable was used; good customer relations were maintained.

Even severe tree conditions like this in an urban residential area were overcome by the use of G-E pre-assembled aerial cable. This is a 3-conductor, 4/0, 5kv line that has stayed in service in spite of high wind, sleet, snow.

You can put your confidence in—

GENERAL ELECTRIC



Wire Grips Merchandised

(4) BullDog Electric Products Co., Detroit 32, Mich.

Availability of its silver-coated wire grips for general distribution has been announced by the manufacturer. Previously the line was produced only for use with the company's own products.

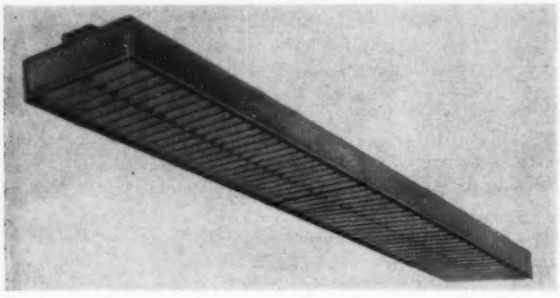
In conformance with its production simplification policy, the manufacturer will market the wire grips in five sizes covering all wire sizes from No. 14 to 1,000,000-CM cable. The cold-forging production method will be continued to give greater strength of the electrolytically pure copper from which the grips are formed, it was stated.

The two largest grips have saddles that fit the curvature of the cable so that good contact is made over the entire circumference. Serrations on the saddles give better gripping as well as better contact.

Compound in Tube

(5) Burndy Engineering Co. Inc., Norwalk, Conn.

Penetrox A, an oxide-penetrating, corrosion-inhibiting compound for all electrical connections involving aluminum, now comes in a 5-oz tube. Each tube is individually packaged in a cardboard carton to prevent crushing or leakage. The protruding spout facilitates application. The compound also comes in pint, quart and gallon cans.



F Fixture for Stores

(6) The Miller Co., Meriden, Conn.

Designed especially for stores, the Burlington fluorescent fixture features 2-way lamping from one ladder position and a latch that requires only a quarter turn to drop the chain-suspended louver assembly to open position. Louver assembly is of one-piece steel, with choice of glass or plastic sides. Available as a 2- or 4-lamp fixture for slimline, general line and rapid-start lamps.

New Process for Connectors

(7) Jasper Blackburn Corp., 35 Madison St., St. Louis 6, Mo.

A new process, claimed to increase the mechanical efficiency of split-bolt connectors made of copper alloys, consists of a series of chemical-dip treatments that result in the formation of a microscopically thin, tightly adherent film, which has extreme pressure lubricating characteristics plus excellent corrosion and oxidation resistance.

Primary purpose of the new treatment, according to the manufacturer, is to increase the clamping force on the connected copper cables, which in turn increases the conductivity of the joint. The increase of conductivity is said to result from the greater breakdown of the oxide film normally present on copper wire and to the broader contact areas created by the higher pressure.

The larger areas of contact between the strands of wire is said to prevent slipping and reorientation of the strands, which would cause a gradual loosening of the connection over a period of time. The high pressure between the strands also seals out air and moisture.

A normal increase in clamping force of more than 25% for a given torque is claimed for the new process. The exact amount of increase is said to be dependent on the combination of alloys used.

Insulating Compound

(8) Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul, Minn.

A putty-like electrical insulating compound that comes in a roll and applies like tape is called Scotchfil. The black, ⅛-in. thick material fuses into a void-free mass after application. It is designed to insulate and also to pad sharp edges on bus bars, build up cable splices and fill voids around irregular-shaped connectors prior to taping.

The roll is protected by a disposable liner. As the material is used, the liner is stripped off and the putty is molded into place with the fingers, giving a smooth, nonsticky surface said to be easy to tape; not to smear or come off on the hands.

It is used with Scotch brand plastic electrical tapes Nos. 22 and 33 because the backing and adhesive of these tapes form an inseparable bond with the material, adding to the mechanical strength of the splice.

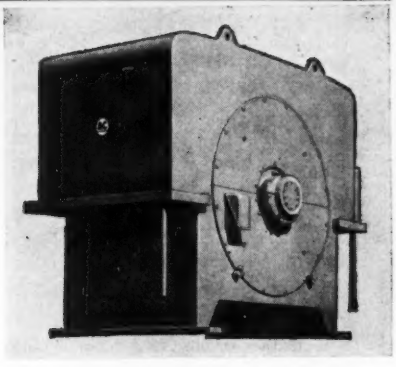
Aging characteristics are said to be excellent and the manufacturer states that the material will not dry out or become hard and brittle. It has a dielectric strength of 350 v per mil and insulation resistance of 100,000 megohms; will not corrode copper or silver, according to the announcement. It comes in rolls 1½ in. wide and 5 ft long.

Fill in the Coupon on Page 56

NO HOUSING PROBLEM

. . . with this Outdoor Motor

Weather-Protected MOTORS



BEST WAY to solve a housing problem is to eliminate the need for housing! That's exactly what the Allis-Chalmers weather-protected motor does. It eliminates the need for a costly building . . . costly in added capital investment, costly in upkeep, and costly in extended construction time.

Proved by Special Tests

We know this weather-protected design can give you these savings . . . plus dependable performance . . . because we've tested it under extreme conditions.

Take the 900-hp, 435-rpm, 4160-volt motor shown above. While running at normal speed and voltage, it was deluged with water at rates up to 40 inches per hour — driven by winds up to 75 miles per hour. This was done repeatedly from all angles. But on inspection, no moisture was detected on the windings of this weather-protected motor.

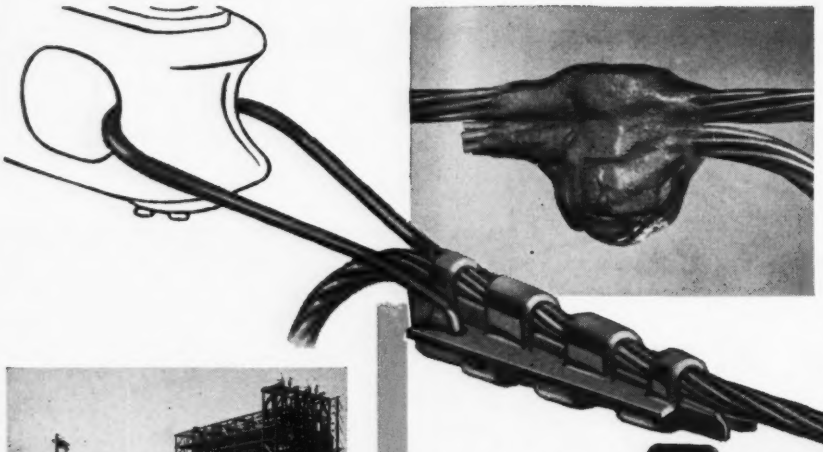
And other tests checked its effectiveness in keeping out wind-driven fine sand.

Bulletin Describes Features

The construction features that provide this economical, super-splashproof performance are available in ratings for all major auxiliary drives. For more information, ask your nearby A-C representative for Bulletin 05R7874, or write to Allis-Chalmers, Milwaukee 1, Wisconsin. A-3907

ALLIS-CHALMERS

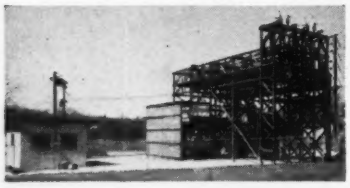
A-C ALLIS-CHALMERS



NEW

AIRSEAL

Easy to apply, Kearney Airseal protects connections. Eliminates high resistance corrosion by sealing out moisture and contaminated atmospheres. An inert, pliable material, it has extremely high dielectric strength (280 volts/mil).



KEARNEY 34.5 KV TEST SUBSTATION

Kearney products are field-proved under actual operating conditions. At our substation laboratory, engineers subject production line samples to exhaustive tests in order to guarantee you trouble-free performance out on the line. Rigorous standards must in every case be met or exceeded before a new product receives approval.

You benefit directly from our proving ground. You can be absolutely sure of our certified ratings. For example, when we tell you that a particular catalog number cutout has a certain interrupting capacity, you can count on that figure. It will not be the result of theoretical calculation or estimation . . . it will be an actual, proved performance rating with extensive test records to back it up.

This certified rating is an added guarantee of Kearney quality. In every case it will not be merely an advertising claim but a professional engineering statement of test results. It will deserve your confidence. For year-in, year-out trouble-free operation, specify Kearney products. The certified rating is your warranty that they are designed and built to do the job.

West Coast Distributor

MAYDWELL & HARTZELL
INCORPORATED
LOS ANGELES • SEATTLE
PORTLAND • SAN FRANCISCO
SPOKANE • PHOENIX

SERVICE CABLE TIE

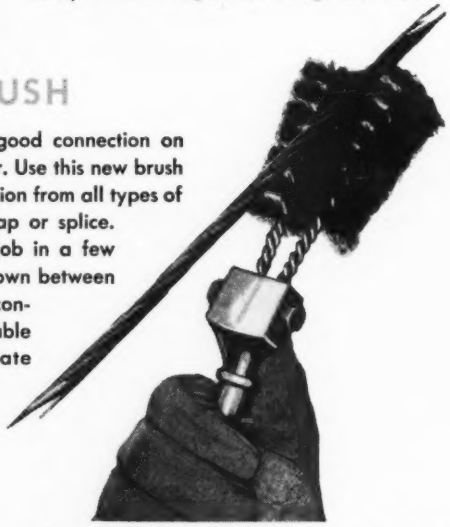
For use with the bare neutral, self-supporting type of service cable, this troublesaver laces the conductors tightly together preventing separation at dead-ends. Quickly installed with the fingers, the soft aluminum tie will not fray like tape nor damage insulation.

WEDGE-TITE CLAMP

This new Kearney clamp is designed to dead-end the bare neutral type of service and secondary cable at either the house or the pole. Of easy-to-handle one piece construction, a serrated wedge grips the neutral with a force proportional to the strain put upon it. Does not transmit tension to insulated conductors thus preventing insulation creep with its dangers of leakage and shorts.

CLEANING BRUSH

It is impossible to make a good connection on dirty or oxidized conductor. Use this new brush to scuff up and remove corrosion from all types of line wire before making a tap or splice. Sturdy steel bristles do the job in a few short strokes. Cleans deep down between strands without damage to conductor. Adjustable, replaceable brush elements accommodate any size wire.



Specify

KEARNEY

JAMES R. KEARNEY CORPORATION

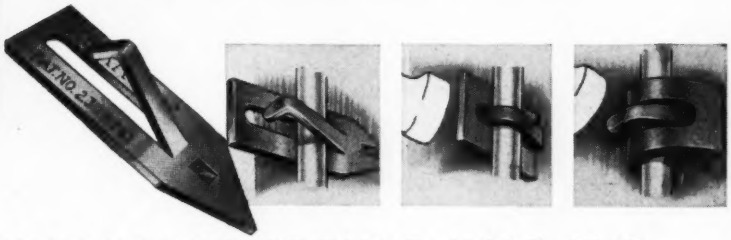
KEARNEY PRODUCTS

designed to help do a Better Job Faster

Profit... or loss for a power company depends largely on three questions. (1) How fast can we do a particular job? (2) How long will it last? (3) How much maintenance will it need?

Kearney engineers, because most of them have been operating engineers, know how important these questions are. They have designed the accessories shown on these pages to do a job fast ... to make it last... without maintenance.

Small items... inexpensive items, but all very important in today's high-cost operation. Use them to reduce expenses; increase profit. Make a place for them on every line truck.

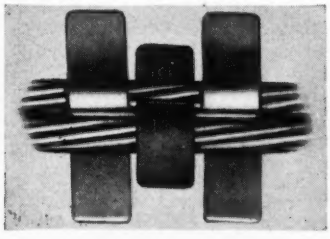


RUST CUTTER

Fast acting Kearney Rust Cutter saves time wasted in sawing off rusted ferrous nuts, bolts or other hardware. Simply spray chemical from self-contained, pressurized can. Atomized mist dissolves hard-to-get-at corrosion and loosens frozen part.

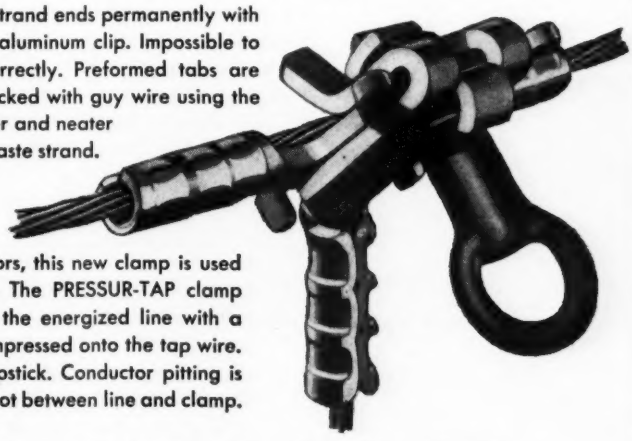
NON-STATIC GROUND WIRE CLIP

Eliminates a major cause of radio and television interference. Prevents air gaps between ground wire and clip. Pressure between wire and clip remains constant even if clip should loosen in wood. Inexpensive to buy, quick and easy to install with a hammer as shown above.



FINGER GRIP GUY CLIP

Serve guy strand ends permanently with this new aluminum clip. Impossible to position incorrectly. Preformed tabs are easily interlocked with guy wire using the fingers. Faster and neater than using waste strand.



PRESSUR-TAP CLAMP

Designed for any type or combination of conductors, this new clamp is used for making permanent, high conductivity taps. The PRESSUR-TAP clamp consists of two parts. One half is compressed onto the energized line with a hot line tool resembling a bolt cutter; the other is compressed onto the tap wire. The two parts are then joined together with a clampstick. Conductor pitting is eliminated because arcing is between clamp halves, not between line and clamp.

PRODUCTS

206

4224-42 Clayton Ave., St. Louis, Mo. ***Canadian Plant:*** **Guelph, Ontario**

CUT COSTS WITH GREENLEE TIMESAVING TOOLS FOR ELECTRICIANS

HYDRAULIC BENDERS FOR CONDUIT, PIPE

Quickly produce your own bends *right on the job*. With a GREENLEE Bender *one man* in but a few minutes makes smooth, accurate bends in pipe and conduit up to 5". Compact, portable . . . saves hours, saves materials.

HAND BENDERS FOR TUBING, PIPE, CONDUIT

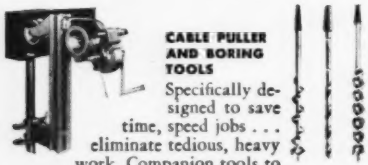
Quickly form small-radius bends without flattening or kinking. Especially designed to make neat bends for sharp corners, nooks and other close quarters. Saves up to 75% in time and materials on many jobs.

KNOCKOUT PUNCHES AND CUTTERS

For fast, easy enlarging of knockouts and cutting of holes in metal boxes, cabinets, panels. Various sizes and models for making openings for conduit sizes from ½" up to 3½". To operate, simply turn with a wrench.

HYDRAULIC KNOCKOUT PUNCH DRIVER

Portable hydraulic unit for driving GREENLEE Knockout Punches. Speeds jobs . . . easily operated. Develops over 11 tons of pressure so that conduit openings are cut in 10-gauge metal with ease.



CABLE PULLER AND BORING TOOLS

Specifically designed to save time, speed jobs . . . eliminate tedious, heavy work. Companion tools to many other GREENLEE timesavers for the electrician.

GREENLEE

Write for new Electrical Tool Folder, Greenlee Tool Co., 1761 Columbia Ave., Rockford, Ill.

Heating Elements

(9) Acra Industrial Electric Co., 9901 Pacific Ave., Franklin Park, Ill.

Flexible heating elements, designed primarily to give wide dispersion of low thermal output in areas where heaters would be crowded and heat localized, are claimed to meet many needs as resistors or heat transmitters. They come in lengths from 2 in. to 20 ft over-all. Diameters run from .108 to .190 in. over their insulated surfaces, depending on degree of dielectric constant required or watts output per linear inch. Tinned terminals 1/16 in. diameter by desired length or with lug-type terminals are also available.

They operate in ambient temperatures from –65 to 250 F. Maximum sheath temperature is held to 375 F by regulation of wattage load requirements of the application. Continuous operation below these is considered proper for extended life expectancy, the manufacturer states.

Gearmotor

(10) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

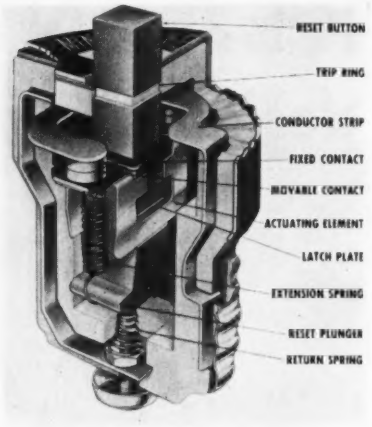
A Lifeline single-reduction gearmotor, type B, meets mounting limitation requirements of side-entry agitators and mixers; is suitable for light-duty coupled-service applications such as fans and pumps. It is available in ratings from 1 to 30 hp, 780 to 420 rpm, AGMA classes I and II.

Plastic Cable Clamp

(11) Holub Industries Inc., Sycamore, Ill.

A noninflammable plastic cable clamp is made of Saran, a tough pliable material claimed to have excellent electrical and thermal properties. It also resists fungicidal attack, corrosion and sweating; can withstand changes in atmospheric conditions.

(12) IMPEDANCE BRIDGE — A new model 250-C1 Universal impedance bridge and companion model 855-A1 bridge oscillator-amplifier has been announced by Brown Electro-Measurement Corp., 4635 S. E. Hawthorne Blvd., Portland, Ore. Accuracy specifications for the bridge are: resistance, plus or minus 0.10%; capacitance, plus or minus 0.25%; inductance, plus or minus 1%. Measurements can be made over the following ranges: resistance, 1 milliohm to 11 megohms; capacitance, 1 micromicrofarad to 1,100 mf; inductance, 1 microhenry to 1,100 microhenrys; storage factor of inductors (Q) 0.02 to 1,000; dissipation factor of capacitors (D) 0.001 to 1.0. The oscillator-amplifier fits into the battery compartment of the bridge and converts it to 115-v a-c operation.



Miniature Circuit Breaker

(13) Mechanical Products Inc., 1824 River St., Jackson, Mich.

A circuit protective device that fits a standard plug fuse-holder comes in 15, 20 and 30 amp for a-c service up to 125 v. It is listed by Underwriters' Laboratories.

About the size of a fuse, it is a thermally actuated device consisting of 25 parts self-enclosed in a tamper-proof insulating case. It is said to interrupt safely excessive overloads and short circuits tripping instantly on shorts; has a built-in time lag to handle temporary starting loads and line surges. Although service normally can be restored in 10 seconds by pressing in and releasing the reset button, the device will not maintain a circuit that has not been cleared of the condition that caused the interruption, the manufacturer states.

High Power Audio Amplifier

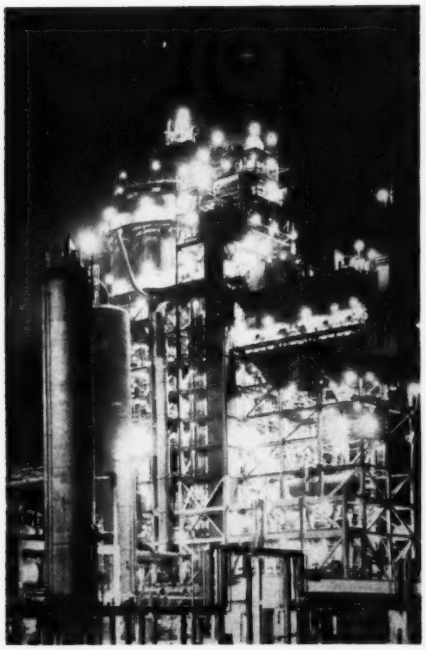
(14) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

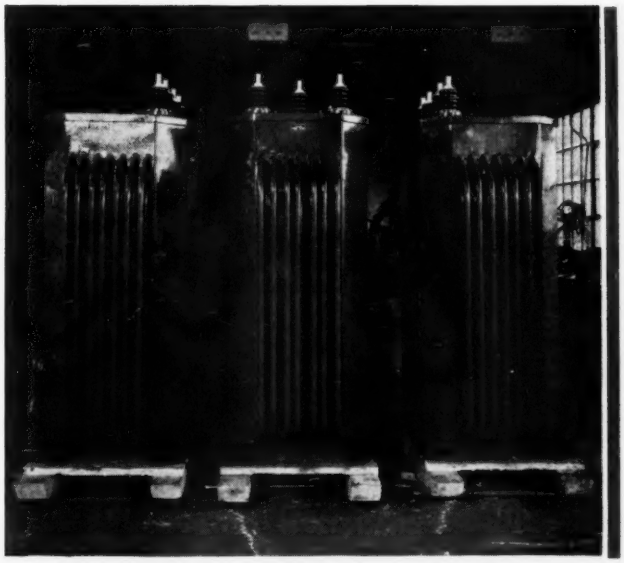
A variable-frequency audio amplifier, type FG 5/10, is capable of delivering either 5 or 10 kw output power. The power amplifier will take a signal of about 10 milliwatts from any conventional 30 to 10,000 cps source and build it up to 5 or 10 kw with uniform response, the manufacturer states.

(15) NEOPRENE TAPE — Bi-Prene, a self-affixing electrical insulating tape announced by Bishop Mfg. Corp., 46 Factory St., Cedar Grove, N. J., is said to give a splicing medium with a high degree of oil and solvent resistance, when vulcanized, plus outstanding dielectric strength and aging qualities. It conforms to irregular surfaces when wrapped under normal taping tension and may be cured in a field or factory patching press to produce a smooth splice, the manufacturer states. It comes in 30-ft rolls, .030 in. thick in standard widths; can be furnished in bulk on special order.

17 YEARS SERVICE— STILL GOOD AS NEW

BACK in March of 1935 the three 250 KVA GARDNER Transformers below were installed at the Tide Water Associated Oil Company Refinery located at Avon, California. The customer says they have been entirely satisfactory in every way during this period of 17 years. Though the appearance of these GARDNER Transformers is similar to the out-moded lines of an automobile of the same vintage, the high quality for which GARDNER Transformers are famed was built into them and gave the satisfactory service the customer expected.





★

Special problems are welcome. Our experience is widespread and our production line is flexible. Write for information.

GARDNER ELECTRIC MANUFACTURING COMPANY

FACTORY AND GENERAL OFFICE

4227 HOLLIS STREET EMERYVILLE (OAKLAND) 8, CALIFORNIA

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We Can Make
YOUR POLES
LAST LONGER
AND LONGER...
AND LONGER...
AND LONGER...
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OSMOSE
INSPECTION AND
TREATING PROGRAM
This program, performed by our highly skilled crews, can save your system hundreds of thousands of dollars in REPLACEMENT COSTS by
1. Absolutely arresting groundline decay of your poles and
2. Giving you up-to-date pole records.
Treatment charge is as low as 4% of replacement costs and pole life is extended for approximately 8-10 years.
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Write for Free Book
DAN KAMPHAUSEN CO.
CONTINENTAL OIL BLDG., DENVER 2, COLO.

Cable Racks

(16) Adalet Mfg. Co., 14300 Lorain Ave., Cleveland 11, Ohio

A series of phenolic insulating cable racks has been added to the manufacturer's line of electrical conduit fittings. It is made of a canvas-base insulating material and is claimed to have high tensile, flexural and dielectric strengths.

The series is divided into two groups as required by the NECode for 300 v and under or over 300 v. Standard racks have maximum size holes possible to maintain required clearances and mounting bolt holes take standard size bolts, it is stated. A modification of the standard carrier rack also is available. It is the clamping type and holes are drilled to fit specified cable diameters.

The new series covers a range of types and sizes, including delta arrangements.

Switch

(17) Delta-Star Electric Division, H. K. Porter Co. Inc., 2437 Fulton St., Chicago 12, Ill.

A metal enclosed Dis-ruptor switch for 600-v a-c or d-c service combines the functions of disconnect and load interrupter. It is claimed to withstand severe usage, to offer safe, positive load interruption. These switches are available in 400, 600, 1,200, 2,000 and 3,000 amp, 2- or 3-pole units with or without provisions for Amp-trap fuses. Publication 5208 gives details.

Wire Stripper

(18) Rush Wire Stripper Division, The Eraser Co. Inc., 104 S. State St., Syracuse 2, N. Y.

A miniature wire stripper, type R midget, is designed for removing film insulations from wire ranging from AWG 50 to AWG 40. It may be used in conjunction with the coil winding machine, mounted on a fixed or swinging bracket or track, in horizontal or vertical position.

(19) INSULATING TAPE—A self-bonding electrical tape, Bi-Seal type V, has the characteristics of the original Bi-Seal patented tape but with increased abrasion resistance, tensile and dielectric strength (more than 1,000 v per mil). It is said to be particularly suited to wire and cable splicing. It has no right or wrong side; does not dry out when stored; can be applied at temperatures as low as minus 40 F; does not become brittle at subzero temperatures. Comes in standard widths, .020 in. thick, 30-ft rolls, clear or black. Special widths can be furnished. Made by Bishop Mfg. Corp., 46 Factory St., Cedar Grove, N. J.

Fittings With Wire Grip

(20) General Electric Co., Bridgeport, Conn.

Electrical connections on flush-mounted outlets and switches can be made without binding screws by means of a pressure lock termination method recently introduced. When installed the new wall switches and outlets look much like conventional devices except that internal pressure lock terminals take the place of binding screws.

The new devices are wired by pushing the stripped conductor leads into terminal holes on the back. The pressure lock inside the device holds the entire stripped length of the wire lead against a contact plate with a grip that will withstand a pull-out test of more than 75 lb for No. 14 AWG wire. Equally firm, positive electrical and mechanical connections are obtained with No. 10 and No. 12 wires, it is stated.

Connections are fully insulated because they are totally enclosed in the device housing. There are no exposed copper wires or terminals. If necessary, wires can be released from the terminals by pressing a small screwdriver into release slots. Devices are designed to fit standard outlet boxes and to take standard wall plates. They are Underwriters' listed; come in brown or ivory plastic. The outlet is rated 15 amp, 125 v and 10 amp, 250 v; the switch is T-rated 10 amp, 125 v and 5 amp, 250 v.

(21) MERCURY LAMP TRANSFORMERS — Two types of 1,000-w mercury transformers are offered by Jefferson Electric Co., Bellwood, Ill. One is for operating the H-12 lamp, the other for the H-15. Each includes transformers for operation on 115, 230 and 460 v. Core and coil assemblies are impregnated with a polymerizing varnish and baked for moisture protection. Design has a large wiring compartment.

See XO CIRCUIT BREAKER
FOR LOW-COST LOAD CENTERS

Amazingly Simple —yet All the Features!

Climaxing nearly twenty years' design leadership in the residential circuit breaker field, Square D now offers this new and remarkably simple type of mechanism. Study the sectional illustration at left—see how simplicity of design (only 3 moving parts) provides accurate, positive operation! See how this same simplicity gives you every worthwhile operating characteristic you want in a circuit breaker—without cost penalty!

QUICK-MAKE, QUICK-BREAK at no extra cost and without use of coil springs. Spring shown above merely positions handle—has no function in breaker operation.

Positive Operation insured by action of handle cam directly against contact arm. No spring coupling.

AUTOMATIC RE-LATCHING. Trips to "OFF." The circuit is restored by simply moving handle to "ON."

Compact. 15-20 ampere, single pole units are only ½" wide. 15-20-30-40-50 ampere, double-pole are only 1½" wide, yet accommodate the larger wire sizes.

AMBIENT COMPENSATED at no extra cost. Additional bimetal automatically regulates operation to surrounding atmospheric conditions—prevents needless tripping.

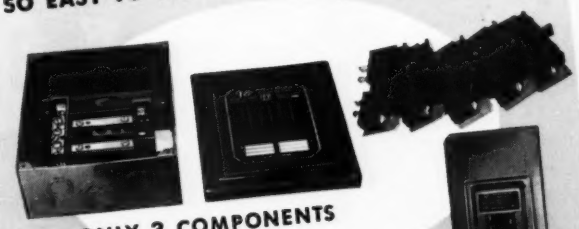
Thermal-Magnetic. 2-way protection against heavy overloads and short circuits.

SHOCK RESISTANT. Simplicity of design, light weight moving parts, and new type spring loading—all combine to make breaker unusually resistant to vibration or shock.

Plug-In Mounting for easy, fast connection to line bus. Steel reinforced, positive pressure clip has been performance-proved on millions of Square D products.

NON-TAMPERABLE ASSEMBLY. Breaker unit width varies with capacity. Impossible to interchange high capacity ratings with smaller sizes.

SO EASY TO STOCK, ASSEMBLE AND INSTALL



ONLY 3 COMPONENTS

- box and interior
- plug-in breaker units
- flush and surface covers

1 TO 32 CIRCUITS WITH ONLY 6 ENCLOSURES

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

Watch for Square D's Display Coach—Now on Tour!

tangle-proof power line for moving machinery

APPLETON REELITE

TRADE MARK

CONSTANT DUTY

You can cut cable costs, speed work and prevent delays and accidents when power for your mobile electrical machines is supplied through Appleton Constant Duty Reelites. These ruggedly built Reels automatically take up and pay out conductor cable—hold cable gently taut, preventing breaks, kinks, tangles. For use with hoists, lifting magnets, cranes, chargers, generator sets—an endless variety of machines requiring flexible power supply.

APPLETON ELECTRIC COMPANY

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APPLETON

CONDUIT FITTINGS • LIGHTING EQUIPMENT • OUTLET AND SWITCH BOXES
EXPLOSION-PROOF FITTINGS • REELITES

Vaporproof Floodlight

(22) Pyle-National Co., 1334 N. Kostner Ave., Chicago 51, Ill.

A rectangular vaporproof floodlight designated type 1570 pit and subway light is designed for recessed or surface mounting in the walls or ceilings of maintenance pits, underpasses, tunnels, subways, and other locations subject to heavy moisture. The reflector can be pivoted to adjust the angle of the beam 18° upward or downward from center. The heat and impact resisting front glass is plain to reduce reflection losses and make cleaning easier.

(23) **SOLDER POT**—The Dee model 11 electric solder pot provides a range of temperatures for all types of soldering and temperature selected is accurately maintained by means of thermostatic control. Solder is maintained at top level by means of four adjustment screws that compensate for any unevenness in the bench or work table surface to which the pot is fastened. A detachable splash guard protects the worker and catches surplus solder, which can be emptied back into the pot. The 45° outside bevel on the taper-top crucible permits closely spaced parts to be dipped, saving motions and making for faster production, the manufacturer states. The product is made by Dee Electric Co. and distributed in the West by Tri-State Supply Corp.

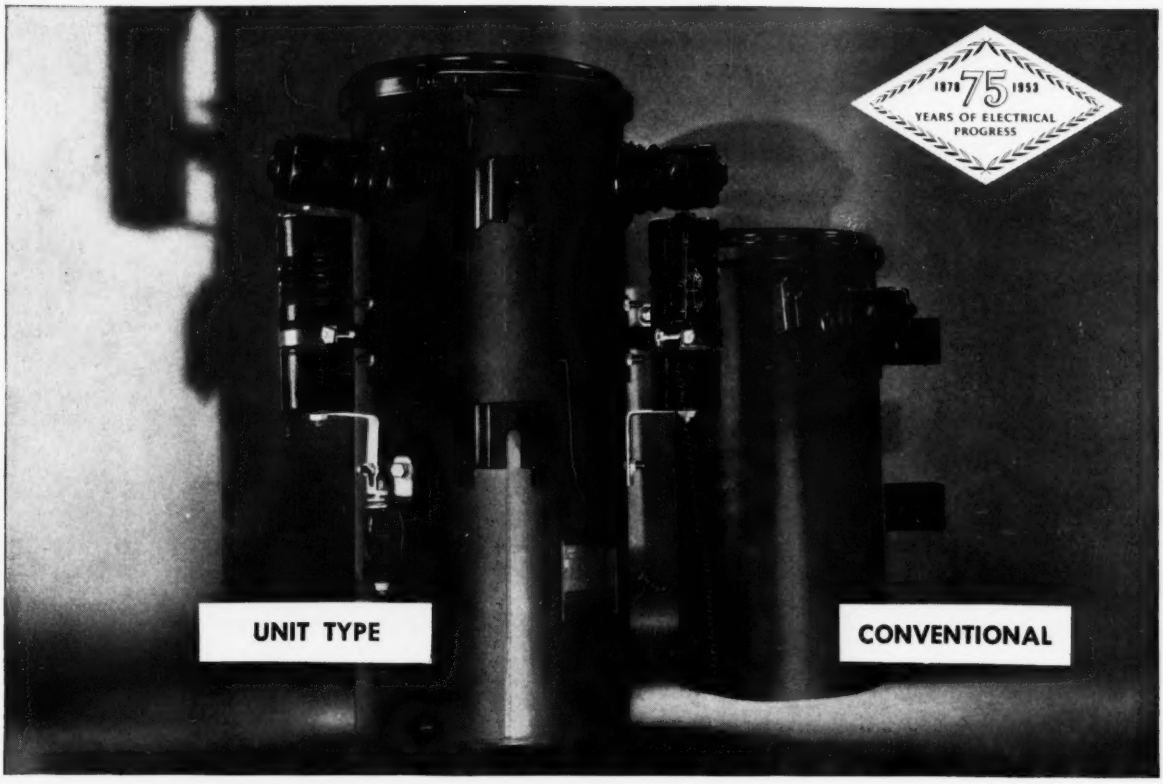
(24) **VOLTAGE TESTER**—Holub Industries Inc., 413 DeKalb Ave., Sycamore, Ill., has announced a voltage tester with one test lead and other new design features. It is called the Hi-Test and indicates a-c or d-c voltage from 115 to 600 v. The second test prod is permanently mounted in one end of the tester. The voltage scale is in the other end; is covered and protected with a magnifying lens.

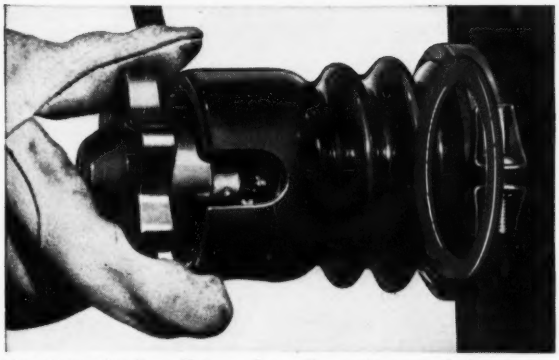
(25) **NEW SWITCH CASE**—A one-piece phenolic case makes the model 41 Levolier switch easier to wire and install, according to its manufacturer, McGill Mfg. Co., Valparaiso, Ind. When one nut is loosened, the case can be removed from the switch mechanism. The 41 is a 6-amp, 125-v switch; is T rated by UL. It is ⅝ in. thick and is lever-operated from any angle.

(26) **TRANSMITTER**—A hand-sized Handie Micro-Talkie transmitter designed to operate in the 152-174-mc band weighs less than 2 lb, has a power output of 20 to 40 milliwatts and a tested optimum range up to five miles. Made by the Communications and Electronics Division of Motorola, 4545 W. Augusta Blvd., Chicago 51, Ill.

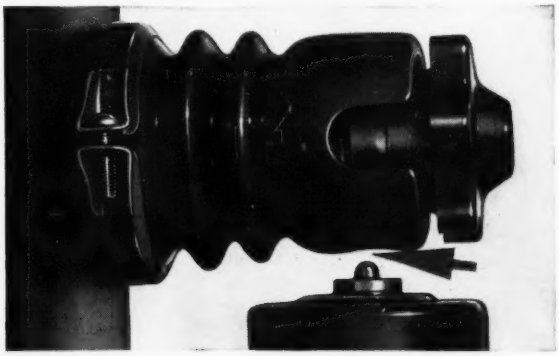
(27) **DEODORIZER**—A scented pill dissipated electrically from a plastic case is claimed to eliminate most common household odors. It is called Odor-Ban, fits into any a-c, d-c outlet, is UL approved. It is molded of Plaskon plastic by Milwaukee Plastics Inc., 3072 W. Capitol Drive, Milwaukee, Wis.

(28) **CONTROL CIRCUIT TRANSFORMERS**—Three sizes—30, 50 and 150 va—have been added to the line made by Hevi Duty Electric Co., Milwaukee 1, Wis. Details in bulletin T-5111.





NITRILE SEAL (in red) is used on all openings—including bushings—to prevent breathing. An extra feature is non-rustable stainless steel band and Everdur bolt which clamp bushing to tank.



EXTERNAL GAP on G-E unit-type transformer isolates arrester from high-voltage lead. The gap keeps arrester at ground potential and prevents line grounding in event of arrester damage.

Easier to Connect Better Protected

New tank-wall high-voltage bushings on General Electric transformers—both conventional and unit type—make them easier to install. They permit faster, safer connections—without tools. Cable can be brought in from either side of the bushings, tightened quickly.

EXTERNAL GAP PROTECTS. On G-E unit-type transformers, the Pellet arrester is externally gapped to the new tank-wall bushing. This gap keeps the arrester at ground potential and prevents line grounding in case of arrester damage. And because the Pellet arrester is of the valve type which can't be eroded by discharge, it offers protection that lasts indefinitely. It can be installed anywhere on your system regardless of short-circuit currents.

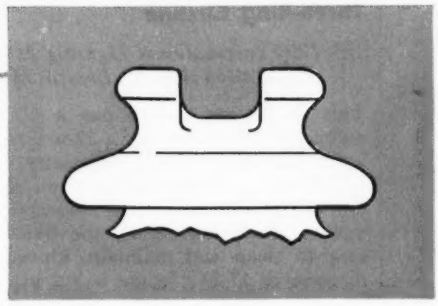
Many ratings of these Spirakore* transformers with tank-wall high-voltage bushings can be shipped directly from one of G.E.'s warehouses near your locality. They're available in ratings 5 kv and below, 100 kva and below. For more information get in touch with your nearest General Electric representative. General Electric Company, Schenectady 5, New York. 431-2

Reg. Trademark of General Electric Company

GENERAL ELECTRIC

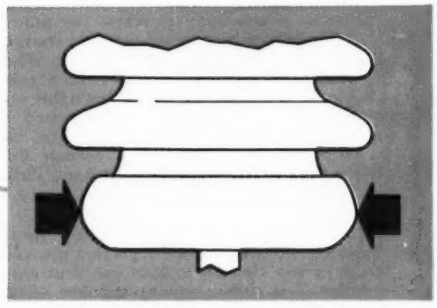
With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

Lapp LINE POST



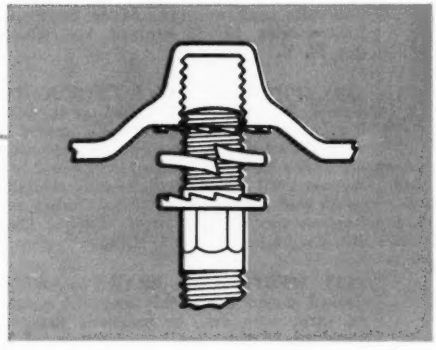
LARGER CONDUCTOR GROOVES

Improved wider square-side top-grooves—conforming to new EEI-NEMA standards—provides for conductor of any diameter up to 1½". Holds conductor in top groove turning angles up to 15° (30° by using two insulators). With 45-Kv and smaller Line Posts, sharper angles may be turned by using side groove for conductor.



HARDWARE EXTERNALLY ATTACHED

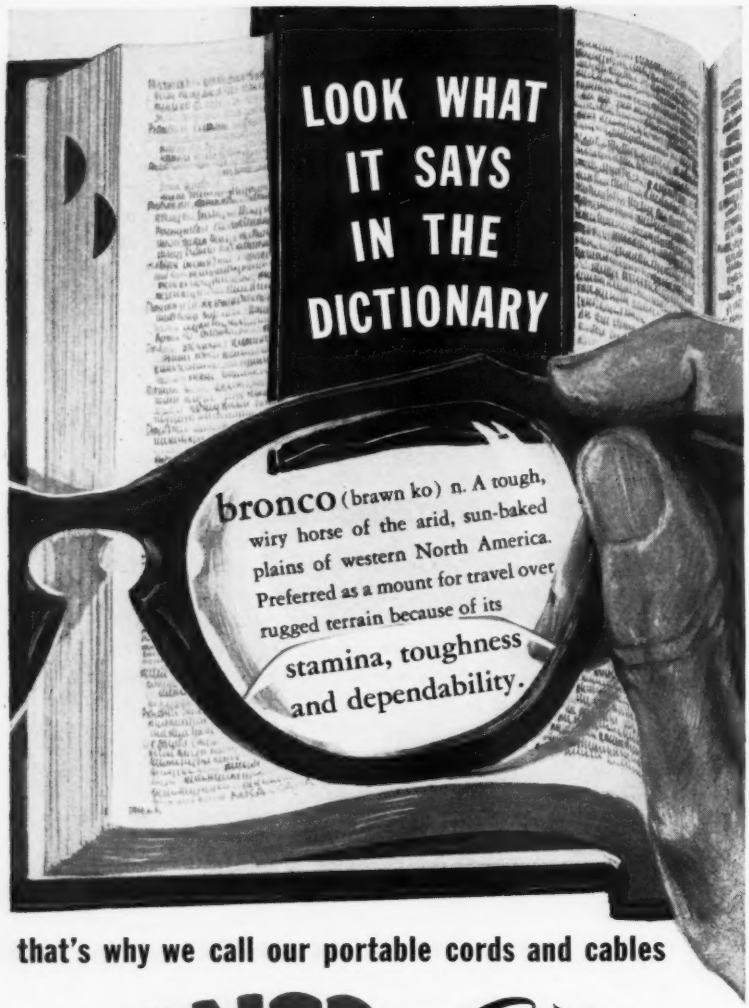
Porcelain is approximately five times as strong in compression as in tension. In the Lapp Post design there are no nested porcelain parts or metal inserts which can load the porcelain in tension—or with any high-intensity local stresses. Hardware attachment is a cemented-on base, providing the safety of a large area, low-intensity compression grip.



INTERCHANGEABLE STUD BOLTS

Stocking problems are reduced with the Lapp Line Post. Separable 7" (for wood cross arms) or 1¾" (for metal mounting) studs—or special lengths on order—are interchangeable for all units, and may be installed in the field. Serrated surfaces in the base and stud flange engage a "positive" lock washer—when the stud is tightened into the base a vibration-proof attachment is assured.

LAPP INSULATOR CO., INC., LE ROY, N.Y.


LOOK WHAT IT SAYS IN THE DICTIONARY
bronco (brawn ko) n. A tough, wiry horse of the arid, sun-baked plains of western North America. Preferred as a mount for travel over rugged terrain because of its stamina, toughness and dependability.

that's why we call our portable cords and cables

BRONCO 60 Certified

it has a tough hide of 60% *by weight* Neoprene that is highly resistant to sunlight, ozone, oil, acids and alkalis. *Certified* has a heart of 99.9% pure soft annealed fine-stranded copper conductors coated with super-aging Cold Rubber insulation. Synchro-curing gives it stamina and flexibility. Jackets are branded with complete data, "BRONCO" repeated every two feet makes it easy to measure To get the most dependable, flexible, convenient cord made, always specify Bronco 60 *Certified*

WESTERN INSULATED WIRE CO.
Los Angeles 58, California

Three-Ring Circline

(29) International Lighting Inc., 6511 Easton Ave., St. Louis 4, Mo.

This fluorescent fixture has a 40-w outer, a 32-w middle and a 22-w inner lamp. It operates without a starter. It comes with a white enamel or an all-chrome finish. The lamp holder design is claimed to make the fixture easy to clean and maintain. Outside diameter is 17 in.; height is 5¼ in.

(30) EMERGENCY LIGHT—The Exide Lightguard is about the size of a portable typewriter, consists of one or two 25-w sealed-beam floodlights with power supplied by a plate glass jar storage battery. A magnetic switch automatically connects the floodlights to the battery when normal current is interrupted. When the unit is not in use, its battery is kept fully charged from the regular electric circuit. When normal power service is restored, a relay automatically turns off the floodlights and turns on the charging unit. Claimed to illuminate 4,000 sq ft of floor area, the unit is made by the Electric Storage Battery Co., 19th and Allegheny Ave., Philadelphia 32, Pa.

(31) POWER SUPPLIES—The Kepco model 700 features one regulated d-c voltage supply claimed to have excellent regulation, low ripple content and low output impedance. The high-voltage supply is continuously variable from 0-350 v and delivers from 0-750 ma. In the range 30-350 v the output voltage variation is less than ½% for both line fluctuations from 105-125 v and load variation from minimum to maximum current, the manufacturer states. The ripple voltage is less than 10 millivolts peak to peak. Made by Kepco Laboratories, 131-38 Sanford Ave., Flushing, N. Y.

(32) SPINNING-FRAME MOTOR—Designed for the new Saco-Lowell SG-1 Gwaltney spinning frame, this motor is totally enclosed, fan cooled, self cleaning; fits under the frame. Can be supplied in a water-cooled model. Both models available in 15 and 20 hp at 1,800 rpm; other ratings on special order from General Electric Co., Schenectady 5, N. Y.

(33) HYSTERESIS BRAKE—An improved model that holds constant tension on yarn, wire, etc., by magnetic drag instead of friction has been announced by the control department of General Electric Co., Schenectady 5, N. Y. Construction permits operation speeds up to 700 yd per minute while tension control ranges from 3.5 to 10.5 grams.

(34) LUBRICANT—An air-dry lubricant, Lubond, that can be sprayed or brushed on has been announced by Electrofilm Corp., 7116 Laurel Canyon Blvd., North Hollywood, Calif. It is claimed to have excellent lubrication characteristics at temperatures from −70 to 300 F; may be applied to steel, iron, stainless steel, lead foil, aluminum, brass, wood, cork.

(35) WALL PLATES—Eagle Electric Mfg. Co. Inc., Long Island City, N. Y., has redesigned its wall plate line under the trade name, Eagaline. The new line consists of 12 styles in brown or ivory, heat-resistant urea and phenolic compounds.

Look!

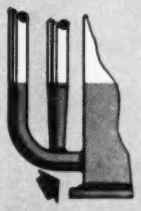
THIS TRANSFORMER BEATS CORROSION AND FLOODING

ALLIS-CHALMERS

NETWORK TRANSFORMERS

SPIRAL-WOUND GASKETS . . . Performance Proved

Spiral-wound bushing gaskets consist of alternate plies of preformed spring-like metal and nonmetallic fillers, providing resilience that maintains a leak-proof seal. The gasket adjusts itself to changes in operating conditions.

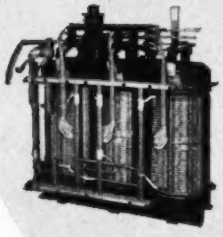


SPECIAL SURFACE TREATMENT

To provide high moisture resistance there's grit blast cleaning plus three coats of baked-on phenolic paint. Added to this is a special coat of bituminous compound that covers surfaces and cooling tubes in the base areas.

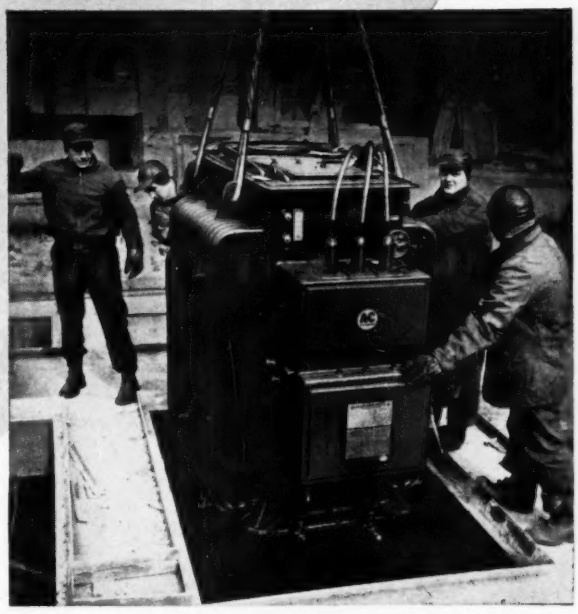
WELD SEAL CONSTRUCTION

The main cover and switch compartment are welded to the tank. In this way gasketed joints are eliminated . . . preventing breathing, extending insulation life and reducing requirements for filtering.



HIGH THERMAL CAPACITY

Characteristic of this compact low-loss design are the high thermal capacities for severe load conditions. Sturdy, time-proved core and coil construction is built to meet repeated short circuit stresses of network operation.



This 500-kva sealed network transformer is one of ten Allis-Chalmers network transformers serving the new Gateway Center in Pittsburgh. Accessories are located for maximum convenience.

NO DOUBT ABOUT IT! Underground vault conditions are rough. But Allis-Chalmers network transformers are specially designed for such underground service.

They're built to withstand flooding and complete submersion in water. Their surface is protected against the effects of industrial gases, dust, salt, rain or mild atmospheric acids. As electric utilities' operating records show, they supply the continuous energy necessary for health and safety in your city.

SERVICE RELIABILITY SAVES MONEY

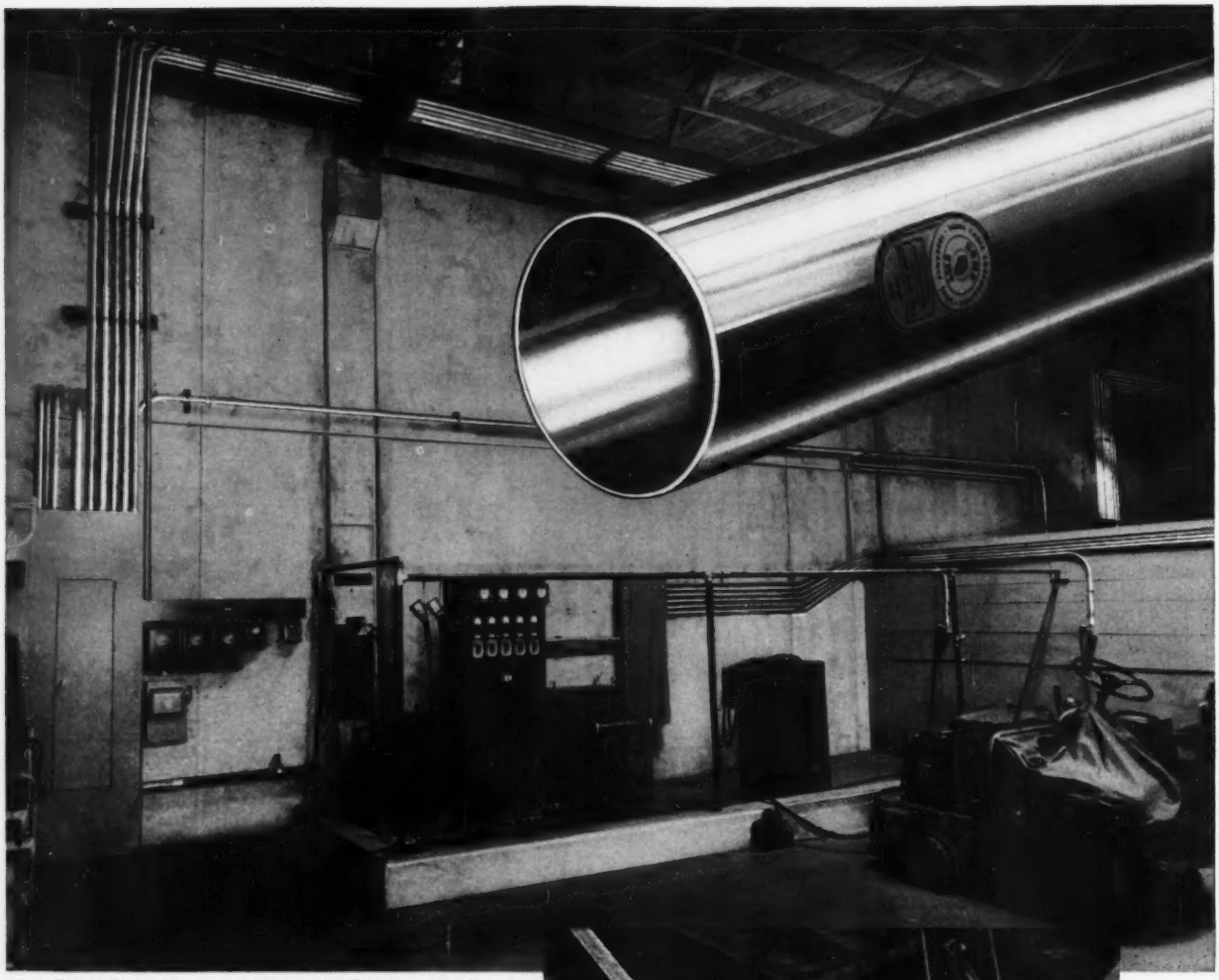
Stability for dense load areas, improved voltage regulation, elimination of costly substations and hazardous overhead lines — these are but a few of the important benefits of network systems. They are brought out best over a long period of time with A-C network transformers.

You'll find your every day requirements are successfully served by these *standard* designs; oil-filled, *Chlorextol* liquid filled or sealed dry-type. So if you're planning to expand your network system you can select the specific Allis-Chalmers transformer best for your system.

For more information about this standard line of network transformers write Allis-Chalmers, Milwaukee 1, Wisconsin, or get in touch with your nearby A-C district office. A-3921

Chlorextol is an Allis-Chalmers trademark.

ALLIS-CHALMERS A-C ALLIS-CHALMERS



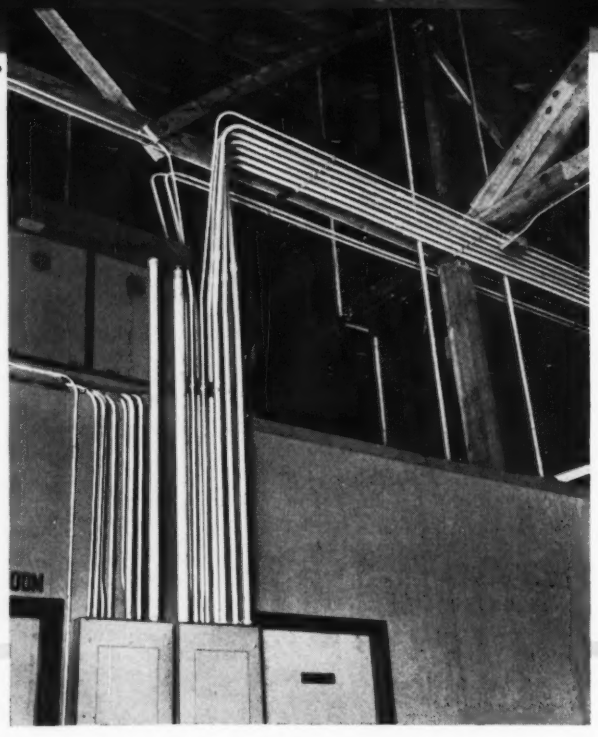
Installation: General Services Administration Warehouse, San Francisco
Electrical Contractor: Charles B. Farrow, San Francisco

Upper runs of Rome • EMT carry wires and cables from main distribution panels and feeders to subpanels for lighting and conveyor systems. Lower runs carry distribution cables to battery-charging outlets from the main charging panel (lower foreground). Rome • EMT protects other wires and cables going from the lighting distribution panel to serve the warehouse office and truck entrance.

Rome • EMT is now available in the following sizes: STRAIGHT LENGTHS—½", ¾", 1", 1¼", 1½" and 2". 90° ELBOWS—¾", 1", 1¼", 1½" and 2".

Warehouse stocks located as follows:

San Francisco, Calif.	Los Angeles, Calif.
Chicago, Ill.	Salt Lake City, Utah
Dallas, Texas	Seattle, Wash.
Denver, Colo.	St. Paul, Minn
Torrance, Calif.	



For unexcelled wire and cable performance:

RoZone® **RoLene**
RoMarine **RoFlex**
RoPrene® **RoBarn**
Rome Synthinol®

You get Positive protection at substantial savings with Rome EMT

Installation of Rome•EMT in the New General Services Administration Warehouse in San Francisco is another instance of its wide acceptance in the West.

In factories, generating plants, apartments, institutions, stores and office buildings, Rome•EMT provides safe and positively protected electrical installations. Electrically welded, it has unusual strength, while its electro-galvanized surface, uniformly coated with zinc, assures long-time resistance to corrosion. The mirror-smooth interior surface, absolutely free of burrs and rough edges, prevents cable injury and facilitates fishing and pulling. Precision manufacture assures uniform diameter and wall thickness.

Low installation cost is the great plus feature of Rome•EMT. Light in weight, it's easy to handle and bend—keeps costly man-hours at a minimum. Simple compression-type fittings assure quick, moisture-tight seals, without time-consuming threading.

It's easy to see why Rome•EMT is being specified for so many big wiring jobs. It's simple to install. It's *safe* to install. Fully approved by Underwriters' Laboratories, Inc., it meets all standards for thin-wall raceway!

You'll find that the quality, dependability and economy of Rome•EMT also extends to the entire Rome line of wire and cable. Whatever your requirements, your nearby Rome Cable office will be glad to help you in planning for them.

It Costs Less to Buy the Best

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ROME • NEW YORK
and
TORRANCE • CALIFORNIA

ROME CABLE ROME, N.Y.

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230 South 4th West St.

LOS ANGELES 21, CALIF.
2038 Bay Street

SAN FRANCISCO 24, CALIF.
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MARCUS
DRY TYPE transformers

first with Dry Type, Pole Mounted Transformers

first with Quinterra Insulation

NOW... first

with HI-HEAT HI-DIELECTRIC Magnet Wire

Nothing is ever considered so good at Marcus that improvement isn't searched for constantly. Since insulation is the heart and backbone of any transformer, Marcus is proud to announce its use of the first real advancement in Class B insulated magnet wire in 12 years. The combination of Johns-Manville *Quinterra* with DuPont *Mylar* and *Dacron* not only provides exceptional heat resistance but dielectric strength as high as 10 times that of the present industry standard. Failure at such vulnerable points as turn-to-turn and layer-to-layer becomes a virtual impossibility. Moreover, another Marcus first, *Quinglas*, having unusually high physical strength, adds extra protection between layers.

Insulation levels never thought possible or economical with dry type transformers are now available from Marcus, one of the largest manufacturers in the world of dry type transformers exclusively. Capacities from 1 to 3000 KVA, up to 15,000 volts.

Representatives in Principal Cities

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MARCUS
PIONEERS IN THE FIELD OF DRY TYPE TRANSFORMERS

"Mark of Quality"

TRANSFORMER CO., Inc.
32-34 MONTGOMERY ST.
HILLSIDE 5, NEW JERSEY

(36) TEST UNIT—Type 10249 is a local control adaptor used in making operational checks and adjustments during installation or servicing of FM mobile radio equipment types 2750 and 2975. This unit is said to aid the service engineer by permitting direct connection of test microphone and loudspeaker at the transmitter-receiver chassis. The local control is important where the control head and the transmitter-receiver chassis are not installed in the same compartment of the vehicle. While in use the unit permits operation of the equipment at the transmitter chassis. However the control head in the driver's compartment retains control over on-off, squelch and volume and channel selection in multifrequency installations, the manufacturer states. Product of Link Radio Corp., 125 W. 17th St., New York City.

(37) ROUND-CHART RECORDERS—These new round-chart Dynamaster models are claimed to be accurate, high-speed, continuous-balance, null-type electronic instruments that can be used to measure any variable that can be translated into an electrical quantity such as d-c current, d-c voltage, capacitance or resistance. The measured variable is simultaneously recorded on a 12-in.-diameter chart and indicated on a large circular scale that is legible at a distance. Models are offered for full-scale pen travel in 7, 3, 1½ or ⅔ seconds and with a variety of ranges. Made by The Bristol Co., Waterbury 20, Conn.

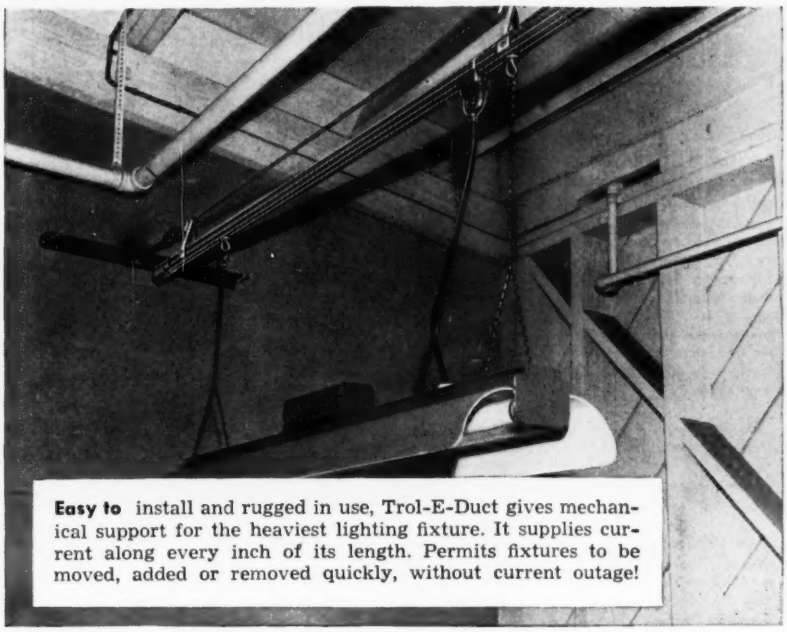
(38) SMOKE INDICATOR — Combustion Control Corp., 720 Beacon St., Boston 15, Mass., offers the Fireye photoelectric smoke indicator series FE, which continuously indicates the density of smoke passing through the stack of a power plant and signals when density exceeds a preset valve. The alarm can be set to operate in a range of smoke density from 10 to 100% light cut-off.

(39) PUSH BUTTONS—New key-operated cylinder locks for oiltight push buttons are available from Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. They come in two basic types: the selector switch, which has either two or three rotary positions; the push-button type, which can be depressed in either full or intermediate positions.

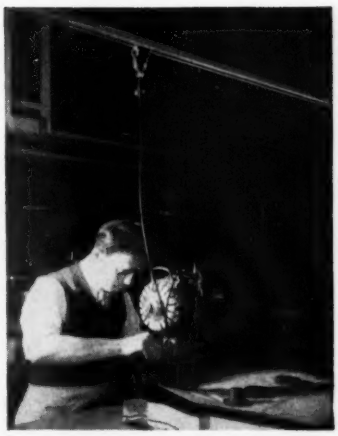
(40) FIXTURE—A fixture that can be screwed into any ceiling incandescent lamp socket is being manufactured by Geringer & Sons Mfg. Corp., 600 Cathedral Parkway, New York, N. Y., and distributed in the Pacific states by Panama Lamp & Commercial Co. Inc. The fixture is screwed into the socket like a lamp bulb, the glass shade is slipped into position and secured with its cap.

(41) DEODORIZER — An electric deodorizer the size of a walnut is plugged into an electrical outlet. It can be secured with special medicated tablets for sufferers from allergies. Other tablets are spring bouquet and pine. Made by Better Life Products, Dept. 506G, Mason Bldg., Fresno 21, Calif.

(42) PLASTIC EYE SHIELD — This spectacle-type, all-plastic eye shield for semihazardous operations has a flexible, one-piece curved acetate lens that can be replaced quickly by bending and snapping it in or out of place. It can be worn over regular or corrective safety glasses; is available in crystal or green. Made by Bausch & Lomb Optical Co., Rochester, N. Y.



Easy to install and rugged in use, Trol-E-Duct gives mechanical support for the heaviest lighting fixture. It supplies current along every inch of its length. Permits fixtures to be moved, added or removed quickly, without current outage!



Wherever an electric hand tool is used, it needs mobility. BullDog Universal Trol-E-Duct provides complete mobility with trolleys that roll on steel wheels, furnish power as they roll! Trol-E-Duct is enclosed at top and sides, requires no cleaning or maintenance.

Here's a really versatile lighting system you can quickly install with a screw driver!

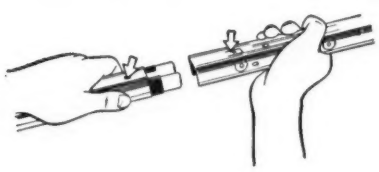
Completely salvable . . . meets tomorrow's lighting need as well as today's!

Universal Trol-E-Duct is completely prefabricated for highest flexibility, quick, easy installation. Interchangeable sections allow it to be dismantled and installed elsewhere at any time without so much as a single scrapped part. Only tool needed is a screw driver!

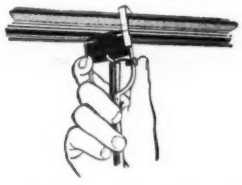
Here's industrial and commercial lighting at its very best! Rigid steel duct encases solid-copper bus bars. Through these bars Universal Trol-E-Duct delivers current at any point along its entire length.

Twistout tap-off plugs insert anywhere in the duct with a twist of the wrist. Connections are made and broken without cutting off the current!

This modern, low-cost lighting system will solve your lighting-outlet needs, present and future. Write today for information-packed Bulletin B-650, or get complete details from your nearby BullDog Distributor.



Quickly installed. Sections go up in a hurry, join without bolting. Sections are prefabricated, standardized in lengths of 5 and 10 feet. Entire duct can be dismantled and reinstalled easily without a scrapped part.



Convenient. Lighting twistout plugs slip into duct without cutting power or upsetting production schedules. Plugs ground on steel casing before contacts touch bus bars, slide in with a twist anywhere along duct.

Mobile Trolleys. Smooth-rolling trolleys are available to carry small, portable power tools, speed up production. Trolleys ride on track inside duct. Constant spring pressure against bus bars assures perfect contact.

BULLDOG ELECTRIC PRODUCTS COMPANY
DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES
IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO
PIONEERS IN FLEXIBLE ELECTRICAL DISTRIBUTION SYSTEMS

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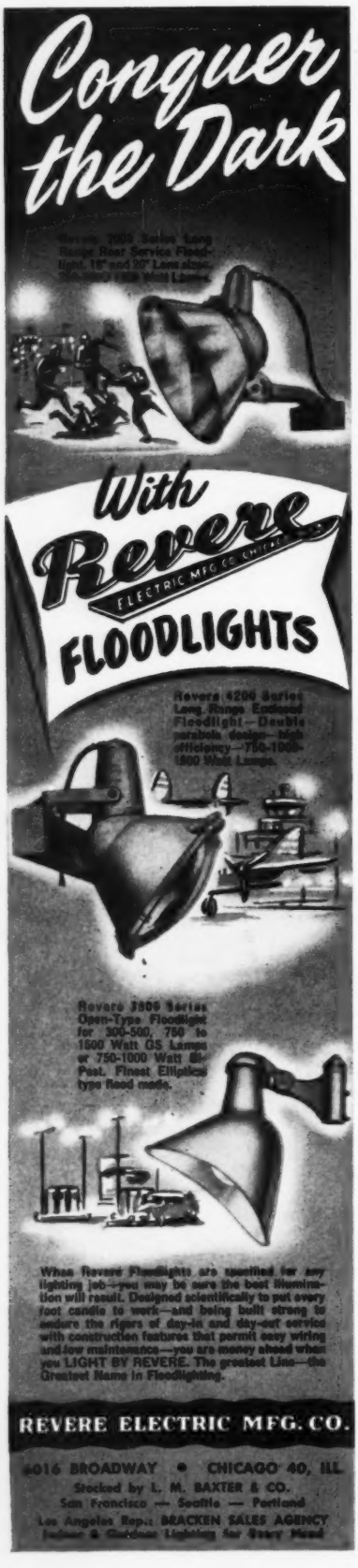
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Stocked by L. M. BAXTER & CO.
San Francisco — Seattle — Portland

BULLETINS ETC.

(43) TURBINE-GENERATORS—A 20-page booklet with some 30 applications of industrial turbine-generators is available from Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. The manufacturer states that because requirements vary from applications where maximum conversion of heat energy to electrical power is most important to those in which process steam is of primary concern, the booklet describes the six principal types of industrial turbines. The booklet is designated B-5418.

(44) CATALOG AND WIRING GUIDE—A 120-page catalog, No. 19, gives information on surface metal raceways and fittings and 2000 Plugmold, made by Wiremold Co., Hartford 10, Conn.

(45) HEATERS—New data and price sheets covering its line of electric heaters are offered by Wesix Electric Heater Co., 390 First St., San Francisco 5, Calif. Portable units and wall furnaces are included.

(46) CIRCUIT BREAKERS — A manual giving operating principles of basic circuit breaker designs and engineering data on application has been published by Heinemann Electric Co., 327 Plum St., Trenton 2, N. J.

(47) MAGNETIC ALLOYS—An 8-page booklet on magnetic alloy tells what it is and where to use it. Alloys covered include Hipernik, Hipernik V, Conpernik and Hiperco. Published by Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa., as TD-52-100.

(48) COMPRESSORS—A descriptive bulletin on hermetically sealed refrigeration compressors and condensing units of 75 to 100 hp is available from Westinghouse Electric Corp.'s Sturtevant Division, 200 Readville St., Hyde Park, Boston 36, Mass.

(49) INFRARED HEATING AND DRYING — A circular on Radiant Ray equipment is offered by Corona Mfg. Corp., 5210 San Fernando Road, Glendale 3, Calif.

(50) SWITCHES—B-2P high-capacity switches for outdoor service are described in an illustrated booklet by Delta-Star Electric Co., Division of H. K. Porter Co. Inc., 2437 W. Fulton St., Chicago, Ill.

(51) DEVICES—Wiring devices, lamps and specialty products are covered in a 48-page 1952-53 catalog issued by Eagle Electric Mfg. Co. Inc., 23-10 Bridge Plaza S., Long Island City 1, N. Y.

(52) ELECTRIC EYES—Applications of electric eyes to process industries are covered in a data sheet (No. 522) prepared by Ess Instrument Co., 96 S. Washington Ave., Bergenfield, N. J.

(53) MOTOR-GENERATORS — A line of low-voltage, d-c motor-generators for electrolytic processes is described in bulletin 20-210 from The Electric Products Co., 1725 Clarkstone Road, Cleveland 12, Ohio.

(54) PLASTICS—A general catalog of 50 standard grades of laminated plastics for industrial use is being issued by The Formica Co., 4614 Spring Grove Ave., Cincinnati 32, Ohio.

(55) CONTACT RIVETS—Electrical contact rivets are covered in catalog C-521 published by Gibson Electric Co., 8340 Frankstown Ave., Pittsburgh 21, Pa.

(56) LIGHTING—A condensed catalog, No. 952, lists the line of recessed, surface and suspended lighting equipment made by Hub Electric Co., 2255 W. Grand Ave., Chicago 12, Ill.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after March 1

Please send me, without obligation, the new product information or catalogs described on the following pages and identified by numbers circled below:

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You can find the

EXACT FITTING

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SERVICE CONNECTORS

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and MANY MORE

PENN-UNION Catalog

The conductor fittings shown here can only suggest the wide variety. You'll find practically every good type, in a complete range of sizes.

New connectors are constantly being added - - so when you need a special fitting for an unusual service, tell us about it. Most likely we have exactly what you want.

Better design is a Penn-Union feature that you'll appreciate. For example, note the large gripping surfaces for wrenches, on the service connector shown in the upper left corner. When you use any Penn-Union fitting, you are sure that it is dependable - - mechanically and electrically.

Preferred by Leading Users, who have found that the "Penn-Union" mark on a connector is their best guarantee of unfailing service.

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The Complete line of conductor fittings

PENN-UNION

ELECTRA'S HUSBAND

"WHAT are you going to do some night when the power goes off or the switch fails on your electric blanket?" Electra asked recently when we were getting ready for bed. "For weeks now you have had the control set at 4. Why you don't toast or roast is a mystery to me."

"If the power goes off or the electronic control fails, I'll have a number of choices," I answered. "I can shiver and like it. I can crawl in with you. I can get up and get some more covers. Or I can get into the bed in the guest room. What I can't understand is how you can sleep comfortably these cold nights with the blanket turned off completely or with the control set at the lowest point."

"Get in the guest room bed," she commented. "Then I won't hear you snore. Why don't your electrical people invent some sort of device to stop snoring? I'll bet a million women would buy a combination electric blanket and snore-eliminator if such a thing were available."

"Speaking of electric blankets, did I tell you what happened to the Maxwells?" I asked. "They bought a double blanket with dual controls—one for him and one for her."

"Haven't they taken to twin beds yet?" she mused.

"No, not yet," I continued. "Well Bill is warm-blooded and doesn't want any heat and Laura is cold all of the time. So the dual-blanket was an ideal thing for them. Anyway they put it on the bed expecting it to give both of them real comfort. Right away Bill was hot and Laura was cold. The lower he turned his control, the hotter he got and the higher she set her control the more she shivered. It went on that way for a couple of nights with Bill swearing and Laura crying. Finally when they were going to throw the blanket away, they suddenly discovered that the controls were reversed. Bill was operating the blanket for Laura's half and she set the controls for his."

"That must have been a riot," she said.

"That isn't what Bill called it," I continued. "The things he said would redden your ranch-toughened ears."

"Well did I tell you about the Crawfords and their blanket?" she inquired. "They did give theirs away."

"They're sensible people," I said. "How could that happen?"

"Neither one of them liked it," she continued. "As a matter of fact they were convinced that it gave them prickly heat. Every morning they woke up with an itching rash on their bodies. Or at least they thought they did."

"That's impossible," I said.

"I tried to tell Madeline that it was purely psychological but she insisted that the electric blanket caused all of the trouble," she said. "I've told you time and again that your mind will do all kinds of tricks to your body if you let it."

"My mind does one trick to my body," I observed. "It's like Wayne Smith said years ago when he first used an electric blanket. How wonderful it is to feel that warm June sunshine on your body in the middle of a cold December night!"

BLANKETS AND BELIEVABILITY

EVERY once in awhile Electra asks me how my friend Fred Green of the ABC Electrical Manufacturing Co. is making out selling his wire. Until just a week ago Fred was not having any difficulties worth mentioning. However, he showed me a batch of correspondence a few days ago which indicated that things were tough once more. I brought it home for Electra to read. Here it is:

ABC Electrical Manufacturing Co.

From: Anderson, Factory 12-2-52
To: Green, San Francisco Sales

You ask once again when we are going to ship 300,000 cir mil shielded ORX(Sn) underground cable for Skinner & Ransom for Olympic airport job. We admit that order was booked ten months' ago (not twelve as you report) and that shipment was promised for Nov. 15. However, you know how tight the copper situation has been. We have re-emphasized this in all of our memos about this particular order.

At the present moment we cannot give you any firm shipping date. The ship from Chile that was carrying the allotment of copper from which this order was to be fabricated has been lost. We have no advice as to its whereabouts or the date it will arrive. Sorry.

(Signed) ANDERSON

From: Green, San Francisco
12-5-52
To: Anderson, Factory

In the name of Christopher Columbus do you really mean for me to tell Skinner & Ransom that fantastic story about losing a shipload of copper from Chile? After all of the silly excuses handed out by you folks at the factory, which I have diligently passed along, I cannot in good conscience tell him one as ludicrous as that.

Before I say anything that will cause him to repeat for the one-thousandth time his comment "Do you folks want our business?" you will have to give me more information. What happened to the ship? Did Bluebeard or some other good old pirate of the Spanish Main capture it and bury the copper because of its great value. Or was it picked up by a Commie submarine, manned with a prize crew and spirited off to Russia?

Or if you sold the copper to somebody else closer to the factory, please say so. Anyway I won't say anything until I hear more from you, unless Skinner & Ransom phone again.

(Signed) GREEN

TWX-SFO 12/8/52
ANDERSON, FACTORY
IGNORE MY MEMO 12-5-52. SKINNER & RANSOM HAVE CANCELLED ORDER. THEY DIDN'T BELIEVE LOST SHIP STORY EITHER.

GREEN

Electra says the lost ship story is far more believable than some of my excuses for failure to live up to my promises to her.

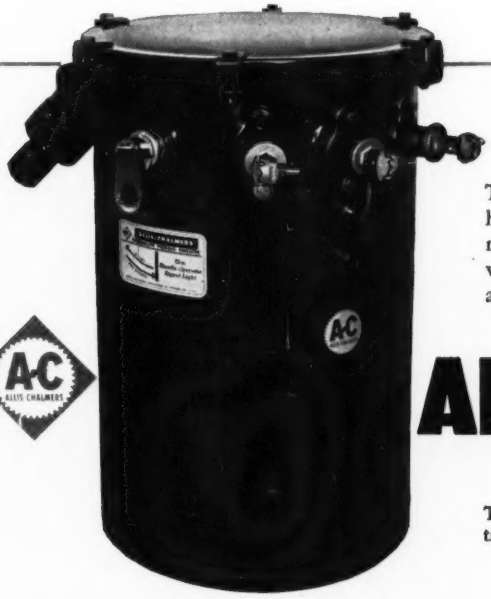
NEW
Thermalite
OVERLOAD INDICATOR

. . . gives you today's biggest value in overload protection

Spots overloads quickly . . . But it won't interrupt service

Here's real ease in overload detection. Check the brilliant light of the *Thermalite* overload indicator right from your service truck. It's visible from hundreds of feet away to keep you posted on load conditions in hard-to-get-at locations.

The *Thermalite* overload indicator shows you when your transformer is overloaded, but it won't interrupt service. That means you can schedule transformer replacements or load rearrangements during daylight hours . . . and do away with costly emergency measures.



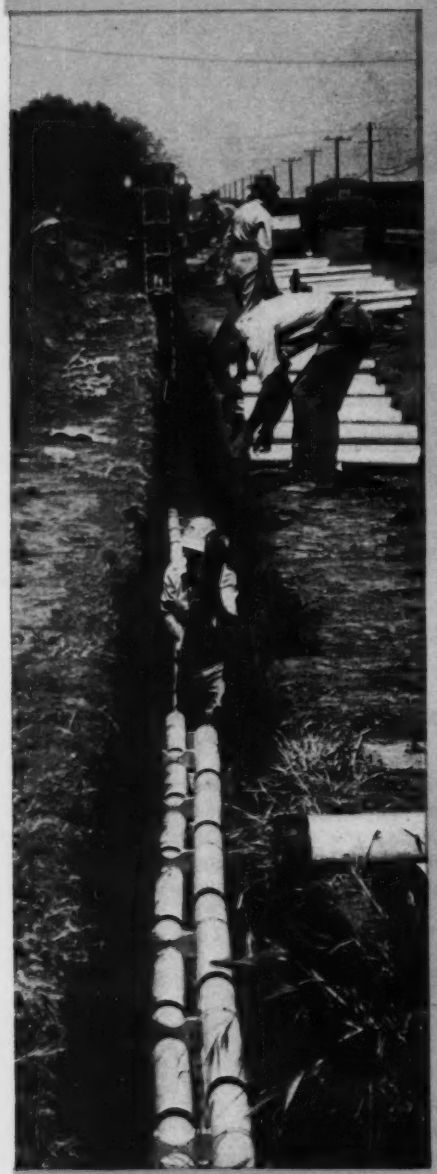
The *Thermalite* overload indicator will save you hundreds of hours of expensive surveys. It eliminates the need for keeping countless records, too. It will pay for itself quickly in transformer utilization and longer transformer life expectancy. A-3843

Thermalite is an Allis-Chalmers trademark.

ALLIS-CHALMERS

The *Thermalite* indicator is available on distribution transformers 100 kva and smaller, 15 kv and below.

SOAPSTONE *SUPERIOR* CONDUIT



How much money will be buried in this trench?

Not *too much*, because the duct is SOAPSTONE

Conduit cost is an important part of underground systems, but construction men find that SOAPSTONE is not only low on first cost but also lowers over-all costs on the job. It's easy to handle in tight places—the illustration shows an 8-way system (2 wide and 4 high) being laid in a trench 6½ feet deep by 18 inches wide. SOAPSTONE is delivered right to the trench-side. Simple, efficient collar-coupling and accurate spacers speed laying — the duct follows right behind the trenching machine.

Low first cost, less handling on the job and faster laying mean that no extra money is buried underground when you use SOAPSTONE *superior* conduit.

The smoothest of all conduits, SOAPSTONE is easiest on cables. Rapid heat dissipation, chemical inertness and inherent long life assure permanent circuit protection. The standard for encased underground duct systems for over 25 years.

SOAPSTONE superior conduit is available in a range of sizes from 2" to 5". Spacers, bell-ends, reducers and adapters for all normal and special situations.

For prices and detailed information contact:

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SOAPSTONE DUCT COMPANY

110 Linfield Drive, Menlo Park, California — Factory: Oakland, California

PERMANENT CIRCUIT PROTECTION

ELECTRICAL BOOKS

ELECTRICAL FUNDAMENTALS OF COMMUNICATION, by Arthur L. Albert, second edition, 531 pages, 6x9, McGraw-Hill Book Co. Inc., $7. Specifically designed for beginning students interested in electrical communications, the book covers basic electrical fundamentals, including telegraphy, telephony and radio with such allied branches as television. Standards of the American Institute of Electrical Engineers and the Institute of Radio Engineers have been followed in preparing diagrams. Special topics include network theorems, impedance-transforming circuits and incremental inductance measurements.

FUNDAMENTALS OF ENGINEERING ELECTRONICS, by William G. Dow, second edition, 627 pages, 6x9, John Wiley & Sons Inc., $8.50. Changes that highlight this edition include meter-kilogram-second system of units used; analysis of the behavior of space-charge control tubes has been modernized; analytical treatment on space-charge, control-tube geometry; basic new principles employed for use in UHF and microwave frequency ranges; energy-level behavior of electrons in semiconductors analyzed with reference to the Fermi distribution and level.

GENERAL SHOP ELECTRICITY, by A. W. Dragoo and C. B. Porter, fourth edition, 119 pages, 8x10½, McKnight & McKnight Publishing Co., $1.25. The book is adapted for text use in unit shops in electricity and in general shop courses, but gives a general knowledge of the facts and concepts about electricity for general use by the layman. Wiring operations are in accordance with procedures as outlined in the National Electrical Code. The contents include simple wiring circuits, magnetism, direct and alternating current, residential wiring, radio, occupational information and appendices.

PRINCIPLES OF ELECTRICITY, by Wendell H. Cornetet, second edition, 341 pages, 6x9, McKnight & McKnight Publishing Co., $4. A textbook in electricity suitable for use in basic course, it includes diagrams and photographs and laboratory experiments that have been tested in classroom use over a period of years. The practical applications of electrical theory are shown through illustration and discussion. Electrical principals and laws are demonstrated by the problems in electricity included. Each chapter is summarized to emphasize the important points of the section.

WRITING THE TECHNICAL REPORT, by J. Raleigh Nelson, third edition, 356 pages, 6x9, McGraw-Hill Book Co. Inc., $4.50. Basic principles and procedures are stressed in this text, so that reports may meet all the requirements for their use. The book is divided into four parts: design and composition of a report; directions for the setup of long and short form reports, with illustrations; systematic procedure for critical examination, with studies of typical cases; course in report writing, which can be used for classroom or as a guide for individual study.

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For many years Contractors from Coast to Coast have used Briegel All Steel Indenter Fittings. U. L. approved as concretetight and for general use, B-M Indenter Fittings are faster, easier to use and neater in appearance.

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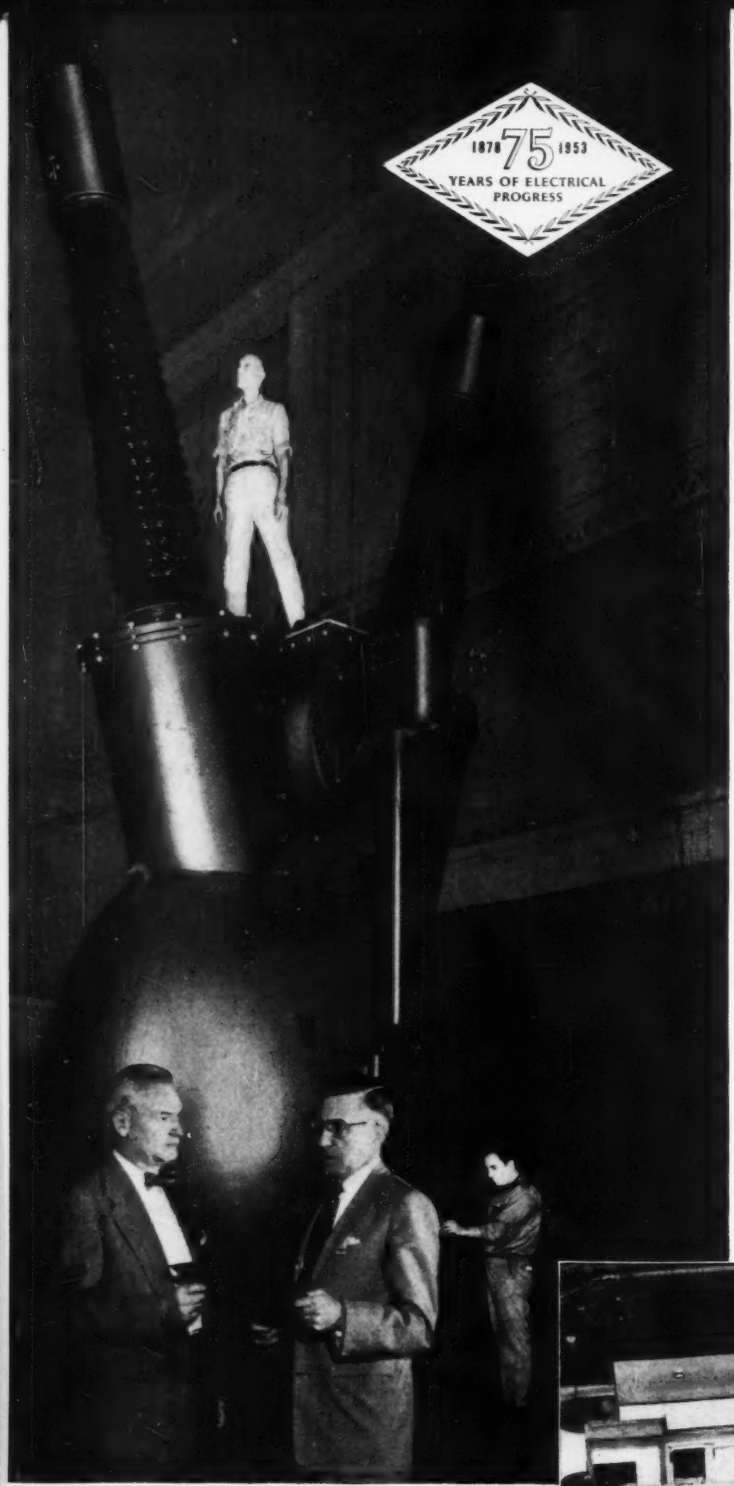


15 MILLION KVA IMPULSE BREAKER

Newest switchgear advance opens way for increased circuit loadings—greater system economies through use of higher voltage transmission

Transmission voltages of 330-kv or more, with circuit loadings approaching a million kilowatts over a 3-phase line, are now seen as the logical pattern for the future on many heavily loaded and constantly expanding systems.

Making possible the economic and other benefits to be gained from such developments are advances like the new G-E steel-clad impulse breaker, one pole of which is shown here. First of fifteen 3-pole units for a 330-kv transmission system under construction, this breaker is rated at 1600 amperes continuous current, 15,000,000-kva interrupting capacity. Features include 3-cycle interrupting time, and 20-cycle reclosing time.

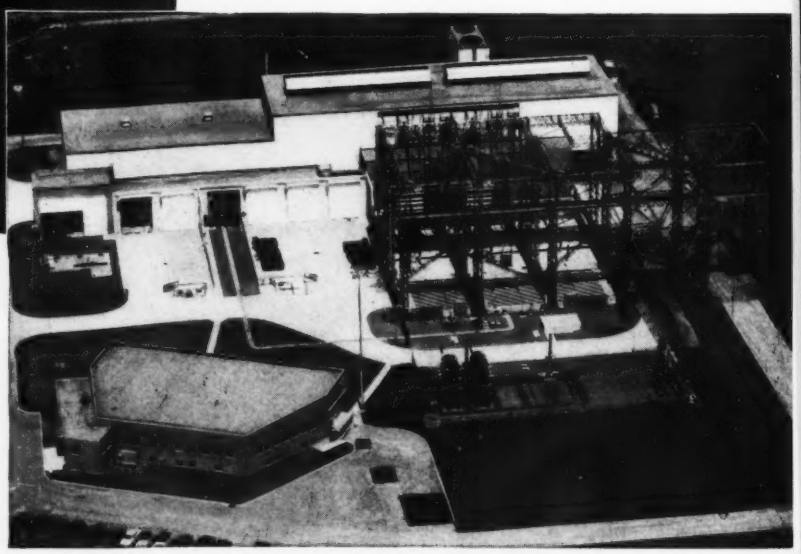
Incorporating the time-tested impulse principle of interruption, the new steel clad breaker design is the result of twenty years of intensive research and development. Behind it is the experience gained in building circuit breakers of continually increasing current carrying and interrupting capacity that have paced every previous step forward in high voltage transmission.

Research leading to further advances in higher voltage equipment will continue, with increasing opportunities for efficient, economical application. General Electric Co., Schenectady 5, N. Y. 301-223

MORE POWER TO AMERICA

GENERAL ELECTRIC

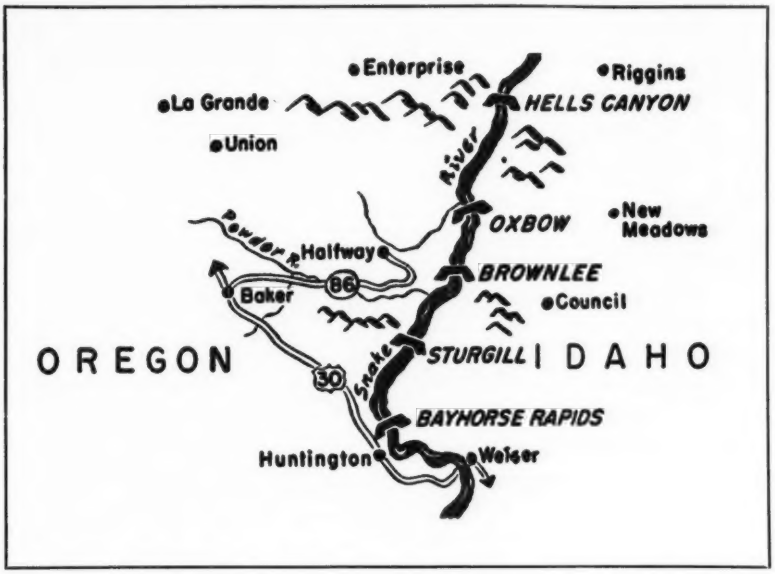
Highest rated circuit breaker ever built, the complete unit comprises three poles, only one of which is shown assembled for testing in the photo above. In the foreground are George Burens (left), General Manager of Switchgear and Control Division, with Earl B. Rietz, Engineer, Power Circuit Breaker Section. Mr. Rietz was responsible for engineering and development work leading to the production of the breaker.



New G-E Switchgear Development Laboratory at Philadelphia (right), providing the world's highest capacity testing facilities, was an important factor in proving design features and making possible the many necessary tests.

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

ELECTRICAL WEST
SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.



Five-dam development on Hells Canyon reach of Snake River proposed by Idaho Power

Are Tax Dollars to Develop Hells Canyon?

Robert F. Ball
Assistant to the President
Idaho Power Co.

The Snake River is the scene of an issue to determine whether the control of its water shall continue to be a function of the people of Snake River Valley or shall be pre-empted by agencies of the federal government.

Hells Canyon is the issue. It is located 104 miles downstream from Weiser, Idaho. At that site the Bureau of Reclamation proposes to construct a high dam with a reservoir backing water 93 miles upstream. The purpose of the Hells Canyon project is power production. No reclamation or irrigation is included.

Construction of the Hells Canyon Dam by the federal government is totally unnecessary because private enterprise is ready, willing and financially able to develop the total hydro-electric resources of that section of Snake River.

The Hells Canyon issue has been widely and fully debated in the Snake River Valley area and the result is widespread opposition to the government proposal. Seldom have the issues involving a government project been so clearly defined.

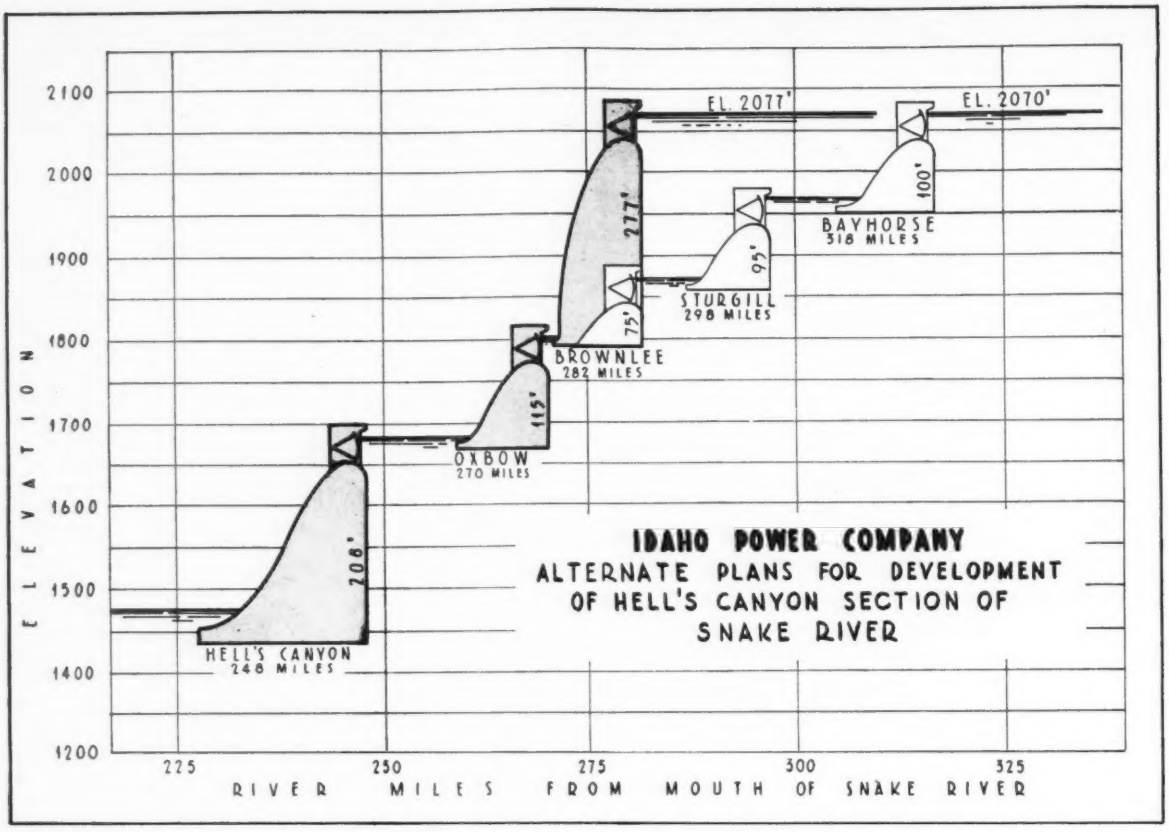
The primary issue is whether the U. S. Interior Department shall assert primary jurisdiction over the waters of the Snake River, thereby jeopardizing existing water rights now valid under state laws. The federal government has attempted to establish such a precedent in the Santa Margarita case in California.

Idaho irrigators are concerned with the fact that in a short water year, in the event Hells Canyon is built, the Interior Department might rule that Snake River waters are more essential for at-site power production at Hells Canyon than for upstream irrigation. Both major Idaho farm organizations, the Idaho State Grange and the Idaho Farm Bureau Federation, together with the entire Idaho Congressional delegation, the Governor, the leading water-right attorneys, the major water-users' organizations representing more than 2,000,000 acres of irrigated land, the Idaho Reclamation Assn. and over one hundred other organizations have taken a strong position against Hells Canyon, recognizing that it is a direct threat to the lifeblood of agriculture-irrigation water.

The companion issue is whether the federal government should seek to invest huge sums of taxpayers' monies to develop a project when private, taxpaying venture capital is prepared and ready to do the job at no cost to the taxpayers.

When Idaho Power Co. commenced operations 36 years ago, it assumed full responsibility for supplying the power needs of the territory that it serves. This responsibility has been completely fulfilled. Not only has there never been a power shortage in the company's service area, but no industry or other customer has ever been denied all the power it required for its existing operations and future growth. Throughout World War II Idaho Power Co. exported substantial quantities of power for use in supplying shortages elsewhere in the Northwest, and immediately following the war began the largest expansion program in the company's history. In the period since 1945, the company has invested approximately $100,000,000 in additional operating facilities, including six new power plants. These plants have increased the company's power producing capacity from 106,000 kw at the end of 1946 to the 375,000 kw at the present time, or 3½ times what it was five years ago.

The territory served by the company, southern Idaho and eastern Oregon, is growing rapidly in both agricultural and industrial development. We estimate that within the



next 10 years between 400,000 and 500,000 additional kilowatts of new capacity will be required by the company to supply our service area, with at least half of this required within the next five years. This will necessitate the construction of at least two new power plants within the coming five-year period, depending upon the capacity of the sites that are available for development. Present indications are that the construction of the first of these plants will have to be commenced early next year.

For approximately five years, since 1947, Idaho Power Co. has had applications pending with the Federal Power Commission for the construction of the Oxbow project, with 140,000 kw of installed capacity, with a commitment to develop fully as needed the entire 104-mile stretch of the river between Weiser and Hells Canyon.

Alternate Development Plan

For the development of that stretch of the river, the company has proposed two alternative programs. One plan proposes a series of five low-head run-of-stream developments at sites identified as Bayhorse, Sturgill, Brownlee, Oxbow and Hells Canyon, with an aggregate installed capacity of 714,000 kw. The other plan proposes to provide approximately 1,000,000 acre-ft of usable storage by developing the power head embraced in the first three upstream locations at a single site by the installation of a storage reservoir at Brownlee.

This installation, along with the low-head developments at Oxbow and Hells Canyon would provide an aggregate installed capacity of approximately 783,000 kw. These two plans provide a flexible approach to the development of the resources of this particular part of the river and, if the Federal Power Commission ultimately decides that some upstream storage is desirable, the three-dam alternative plan supplies all of the storage space that can be economically justified under the conditions of stream flow that will exist when the presently anticipated upstream diversion of water for irrigation is reached.

Oxbow Would Be Low Cost

The Oxbow site is one of the low-head sites planned for development that the government Hells Canyon Dam and reservoir would destroy. The other sites that would be flooded out by a high dam at Hells Canyon are three above Oxbow, known as Brownlee, Sturgill and Bayhorse, and low-head Hells Canyon site below Oxbow would also be destroyed. These sites would provide ideal run-of-stream plants, with between 700,000 kw and 800,000 kw of potential generating capacity.

This entire development can be constructed by Idaho Power Co. at an average cost, even at present-day prices, of between $170 and $180 per kilowatt. The Oxbow site can be developed at an estimated cost of $164 per kilowatt, which makes this 140,000-kw site one of the best and cheapest remaining power sites in the Northwest if not in the entire nation.

The cost of $164 per kilowatt for Oxbow, and an average cost of only $180 per kilowatt for the entire development, compares with the Bureau of Reclamation proposal to spend $446 per kilowatt of installed capacity for a high dam at Hells Canyon.

New Power Resources Needed

Idaho Power Co.'s proposal to construct a series of low-head dams on Snake River is a continuation of the

company's postwar expansion program. It is needed to assure the company's service area of an ample power supply in the years ahead. At the end of 1951, we were servicing approximately 115,000 customers, more than 71,000 of which were residential users, and over 27,000 were farm customers. We have more than 2,300 irrigation pumping customers. The use of electric power for irrigation pumping in our area has increased approximately 500% in the last six years.

The low-head sites in jeopardy because of Hells Canyon are especially important because they constitute 74% of the remaining power potential on the entire course of the upper Snake River, as it flows across southern Idaho and along the Idaho-Oregon boundary within our service area. Moreover, this is all the low-cost hydroelectric power left for the development of the southern Idaho-eastern Oregon territory, and upon which the area depends for its future growth and expansion.

Idaho Power Co. is ready, willing and financially able to develop these sites, and is fully qualified to do so as the practical result of 36 years of experience in constructing and operating hydroelectric plants on the Snake River. Private development of these projects, with related transmission lines, would mean a total taxpaying investment of approximately $160,000,000 for generating and transmission facilities, which would be supplied entirely by investor capital, without the requirement of any expenditure of government funds. Any other program will not only add inevitably to the already huge, and still increasing, tax burden of the nation, as well as to the public debt—but will also prevent the investment of private capital for the creation of substantial taxpaying properties and enterprise.

Hells Canyon Could Cost Over A Billion

The estimated cost of $446 per kilowatt of installed capacity for Hells Canyon is based on the Bureau of Reclamation's estimated project cost of $356,810,000. This, however, does not include $120,000,000 additional for transmission facilities, $1,000,000 for recreation facilities and approximately $5,000,000 for migratory fish preservation facilities, making a minimum total expenditure of $482,810,000, assuming, of course, that the department's estimates of cost can be relied upon.

Experience has demonstrated to the Congress that such departmental estimates, made for the purpose of obtaining project authorization and appropriations, are notoriously inaccurate. For example, the Anderson Ranch Dam project on the Boise River, for which authorization was obtained on a cost estimate of only $13,040,000, has actually cost $30,000,000 to date and all the expenditures are not yet in.

If past experience is any criterion the government Hells Canyon project can easily cost well over a billion dollars. On 31 bureau projects completed since World War II actual costs have been 312% of the estimates upon which Congress authorized them.

Conflicting Government Figures

So many estimates of Hells Canyon power and energy production figures have been made that it is impossible to keep up with them. The conflicting figures and resulting confusion that exist may be illustrated by the fact that, reduced to equivalent figures for purpose of comparison, the nominal prime power output at the Hells Canyon site, based on the Army 308 Report (page 0-233) may be estimated at 502,000 kw; in House Document 473 (page 170) it is 592,000 kw; and the Secretary of the Interior's "modifying" report of May 11, 1951, increases this figure to 688,000 kw.

Adding claimed benefits at existing and authorized plants on the Columbia above Snake River, together with existing and authorized dams downstream from Hells Canyon, to the claimed at-site power output, equivalent figures would be: 701,000 kw, based on the 308 Report; 932,000 kw, based on House Document 473; and 1,430,500 kw, which is the figure claimed by the Secretary of the Interior in his report of May 11, 1951.

In recent publicity appearing in Idaho, this latter figure is hedged somewhat, with a claim of only 1,124,000 kw of prime power capability, apparently based on the assumption of "all projects currently authorized considered as being in operation," which, of course, is not the case and will not be for years to come.

Only So Much Power Available

It is an elementary engineering fact that a given amount of water falling a fixed number of feet can produce only a given amount of power. It makes no difference whether this is accomplished through one high-dam power plant, utilizing the full head or drop, or through the proposed low-head power plants, utilizing the same aggregate head or drop. There is, however, a marked difference, not only in the lower construction cost of the low dams versus the high dam, but also in the energy output obtainable from the two types of development.

The advantage in Idaho Power's proposed low-head developments arises from the fact that the pond water level—that is, the operating head—of the proposed plants will be maintained at a more constant level; whereas, in the proposed high dam at Hells Canyon, the operating head will be varied over a wide range as the reservoir water level is lowered to satisfy alleged multipurpose claims. It is contemplated that at times the reservoir level behind the proposed high dam will be drawn down as much as 289 ft.

During a period of critical water years, such as 1929-32, and under present irrigation water diversion conditions, the average generation at Hells Canyon would be only 473,000 kw. On the other hand, the average kilowatts that could be generated by the low-head run-of-river dams proposed by Idaho Power Co., which do not require storage each year to fill the reservoirs, would be 522,000 kw. This is a 10.36% higher average capacity from the low-head dams proposed by the company than from the single federal high dam at Hells Canyon.

High Price for Downstream Benefits

For all practical purposes, during a critical water period such as existed in 1929-32, the combined at-site and downstream average generation attributable to the Hells Canyon high dam would result ultimately in the production of only 125,000 to 150,000 average kilowatts more than the low-head dams planned by Idaho Power Co. The additional cost of the high dam over the low dams would be at least $225,000,000, excluding necessary transmission lines. This would result in a cost per kilowatt for the additional power obtained of from $1,500 to $1,800 per kilowatt, excluding transmission, which cannot possibly be justified.

The same power can be obtained from other sources for only a small fraction of such cost. As a matter of fact, this relatively small downstream net power gain is the only power advantage that the proposed Hells Canyon high dam will provide, since Idaho Power Co.'s low-head dams will develop the entire balance of kilowatts available in the river. The actual government proposal is, therefore, to spend $482,000,000 of taxpayers' money—or more than $3,000 per kilowatt—to obtain between 125,000 and 150,000 kw of power above

that which private enterprise is ready to provide, without the expenditure of a single dollar of government funds.

Hells Canyon Wasteful

A high government dam at Hells Canyon would be a wasteful and unnecessary expenditure of taxpayers' money. Nevertheless, Hells Canyon has been singled out by government planners, specifically by the Bureau of Reclamation and by the Bonneville Power Administration, as the one they would most like to build. Their enthusiasm is spurred by the fact that it would be the highest dam in the world—a great monument at taxpayers' expense to the bureaucratic planners.

Even if Idaho were willing to be forced into a public power program as a requisite of obtaining a share of any of Hells Canyon power production, according to the project legislation Idaho would nevertheless receive only a minor share of the power produced. The Hells Canyon bill provides that Idaho can qualify for up to 300,000 kw, provided that the state sets up an agency to handle that power in accordance to the dictates of the Interior Department, and provides a time limit for compliance. The balance of Hells Canyon production distribution is left to the whims and dictates of federal agencies.

Not Truly Multipurpose

Hells Canyon is being advocated as a multipurpose project despite the fact that the official project report of the Bureau of Reclamation shows that virtually 95% of its cost will be allocated to power. Despite the fact that the Bureau of Reclamation is its sponsor, the Hells Canyon project has absolutely no irrigation features related to it. Furthermore, the flood control benefits claimed by the government planners disregard the fact that the upper Snake River is already controlled by an extensive series of reservoirs.

Much has been made of the claim that a high dam at Hells Canyon would have contributed greatly to a reduction in the 1948 flood at Portland. The facts are, however, that at the time of the 1948 flood the flow of the Snake River at Oxbow was approximately 50,000 cfs. At the same time, the flow of the Salmon River was 103,000 cfs and that of the Clearwater 177,000 cfs. Clearly, the upper Snake River was not responsible for the flood at Portland, and if federal funds are available for flood control purposes it is logical that these funds should be invested on the rivers where the flood waters originate.

Claimed navigation and recreation benefits ignore the fact that in order to operate the Hells Canyon project for power production purposes the maximum drawdown at the dam would be 289 ft, causing the reservoir backwater to recede 58 miles. **The multiple-purpose theory advanced for Hells Canyon by its planners proposes that it is possible to have the reservoir full for power production, empty for flood control, full for recreation and varying for purposes of navigation, all at the same time.**

No Low-Cost Power at Hells Canyon

There is no low-cost power connected with the Hells Canyon project. According to House Document 473, the official engineering report, sale of firm energy is planned at 4.4 mills per kwh. Financial analysis of the bureau's report shows that the 4.4 mill rate is necessary if, by the report figures, the project is to pay out. This rate, of course, has no tax element connected with it, as federal projects are tax exempt.

Idaho Power Co., is actually supplying power at the present time to the large electric furnace installations at Pocatello at a lower rate than 4.4 mills, and at the same time is paying 31.7% of its total revenue in federal and state taxes.

In the year 1951 the total taxes paid by Idaho Power Co. exceeded $5,307,000. Taxes were by far the company's largest single item of expense. They exceeded total operating wages and salaries by more than $2,900,000. They exceeded total dividends paid to stockholders by more than $3,000,000. Last year the federal government, without having invested a dime in the company's business, took more out of the business than the stockholders of the company, who have some $47,000,000 invested in the enterprise.

If Idaho Power Co. is permitted to go ahead with its proposed low-head development program in the stretch of the Snake River that would be flooded out by the Hells Canyon reservoir, the taxes on the power plants and related transmission facilities will amount to nearly $11,000,000 every year, which would be of real benefit to the national, state and local governmental taxing units.

It is our sincere conviction that the taxes paid by Idaho Power Co. and other electric utilities represent, in these times, an essential contribution to government; and that where private taxpaying capital is ready and willing to do a job, it should not only be permitted, but urged, to do so, leaving the expenditure of federal funds for national defense and for essential government services where the use of taxpayers' money is necessary.

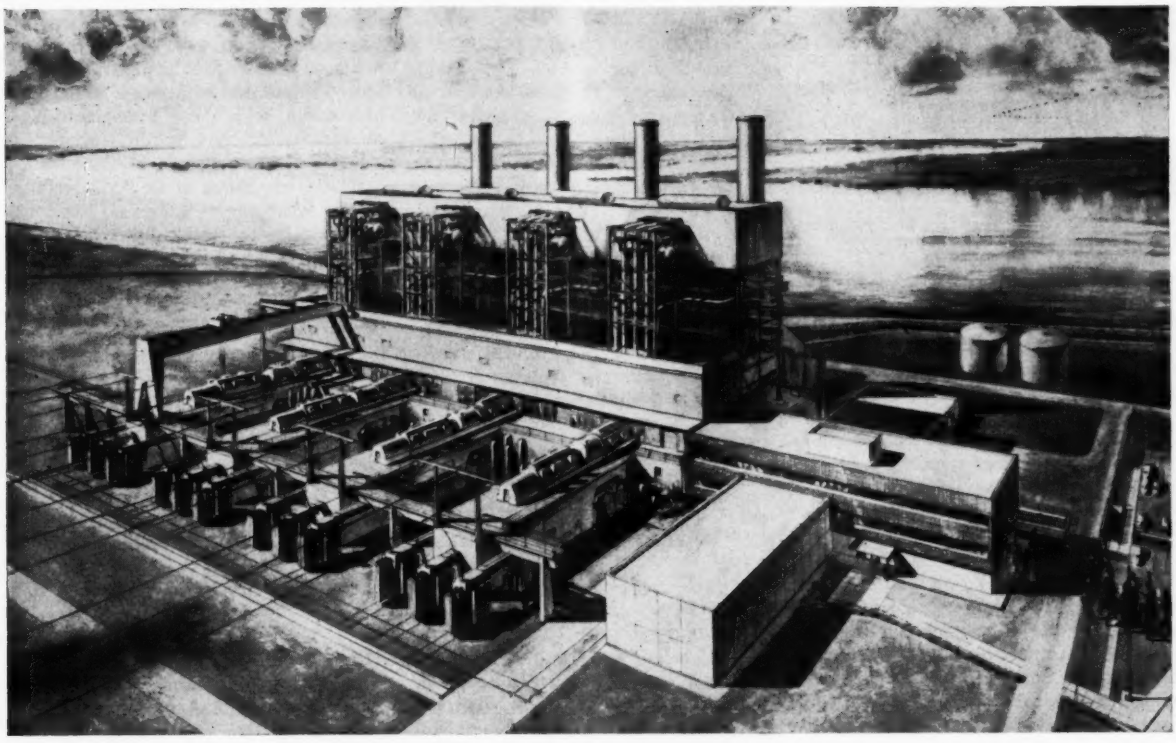
Hells Canyon Bill Temporarily Shelved

Legislation has been introduced in both houses of Congress seeking the authorization of the Hells Canyon project. The Reclamation and Irrigation Subcommittee of the House Interior and Insular Affairs Committee held hearing on HR 5743, the Hells Canyon bill introduced in the House.

The full testimony in behalf of Hells Canyon was presented by the Department of the Interior, Bureau of Reclamation and other proponents of the federal project. Testimony in opposition was heard from grass-roots witnesses representing the Idaho State Grange, Idaho Farm Bureau Federation, Idaho Reclamation Assn., Idaho State Chamber of Commerce, water-users' organizations, water-right attorneys, the Governor of Idaho, Idaho's Congressional delegation, and many farm and business organizations. The ground swell of opposition to Hells Canyon proved a most forceful refutation of the Interior Department claims that Idaho Power Co. is the sole opponent of their Hells Canyon scheme.

The subcommittee voted unanimously, nine Democrats and seven Republicans in attendance, to postpone indefinitely further consideration of the Hells Canyon bill, thus emphatically shelving HR 5743 for that session of Congress. The action was taken without hearing testimony in opposition from representatives of Idaho Power. Without hearing of our objections to Hells Canyon (and they are many) the Congressional group evidently decided it had heard more than enough reasons to turn down the department's pet scheme.

The public power advocates have perseverance. Mike Straus visited Boise recently and issued a statement that Hells Canyon legislation will be introduced in the next session of Congress. He took occasion to chide the people of Idaho for their shortsightedness in failing to recognize the philanthropic instincts of the federal fathers in Washington. So Hells Canyon continues to be an issue, and continuing opposition from the people is essential if the Interior Department is to be thwarted in carrying out its unnecessary and expensive scheme.



Artist's conception of 625,000-kw, semioutdoor-type Pittsburg steam plant of Pacific Gas and Electric Co. now under construction

Atomic Power Plants Are Nearer Reality

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It is believed that a general discussion of the application of atomic energy to the generation of useful electric power will be of interest at this time. During the past year four industrial groups, or teams, have been considering the problems associated with this step in the atomic energy program. Teams were composed of Detroit Edison and Dow Chemical, Union Electric and Monsanto Chemical, Commonwealth Edison and Public Service of Northern Illinois, and Pacific Gas and Electric Co. and Bechtel Corp. These teams have completed their studies and have submitted their reports to the Atomic Energy Commission. Their conclusions and recommendations are being reviewed by the commission. While details necessarily have been withheld, the commission has indicated that these reports are not pessimistic. A further favorable indication is that the industrial participation program is continuing, and additional teams have been invited to take part.

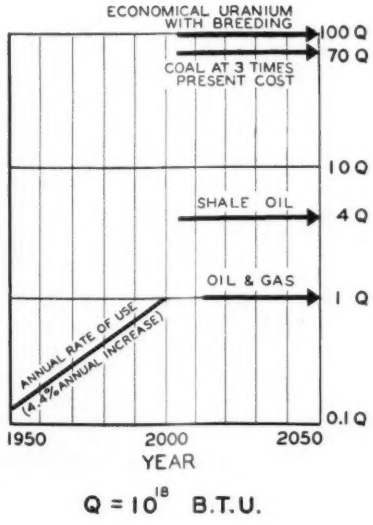


Fig. 1: Estimated reserves of world's fuels

The following discussion is not drawn from these reports, but rather is based on unrestricted information gathered from a number of other sources. Certain basic considerations pertaining to atomic energy will be reviewed with the hope of reaching general conclusions concerning the prospects for an atomic age, and the most promising avenues of approach by which it may be attained.

World Fuel Supply

The first and most significant question to be answered is one that relates to fuel supply. It is simply this: Is there sufficient uranium in the world to justify the efforts that are being made to use it? To answer this question Fig. 1 has been prepared. It in-

Atomic Power Plant Design Considerations

Starts on Page 67

dicates in approximate magnitudes the world's energy resources, as well as the rate of use.

The principal data for this figure were assembled by Palmer Putnam at the request of the Atomic Energy Commission. The figures for conventional fuels were subsequently adjusted in the case of coal reserves, to include sources not now considered economic. Also, the figures shown include so-called "inferred" reserves, in addition to the proved reserves. By this is meant that certain regions where no exploratory work has been done are expected to produce coal or uranium, for example, in amounts that can be estimated on the basis of experience with other similar geological formations.

The unit of energy, Q, used in this chart is defined at 10^{18} Btu. If utilized in a modern steam-electric generating plant with a heat rate of 10,000 Btu/kwh, 1 Q will produce 100 million million kwh. The average steam-electric generating plant is not this efficient, but at the present rate of electric power production, 1 Q would last the United States electric power industry somewhat over 200 years, or it would serve the entire world for nearly 60 years. Since use of electric power is doubling every 10 to 12 years this period would, of course, be considerably shortened. This effect is also illustrated in Fig. 1 where total annual fuel usage for all purposes is indicated.

These data indicate that world reserves of uranium exceed those of coal and are some 100 times greater than those of oil and gas. Even shale oil, which many expect to become an important energy source, is estimated at 4 Q, compared to 100 Q for uranium. These figures indicate that the atomic age will not fail for want of fuel.

The rate of increase in the use of fuel has been estimated by Palmer Putnam to be 4.4% annually for the period from 1950 to 2000. It is interesting to note that the actual rate of increase in electric energy generation in the United States, for the period 1930 to 1950, has been 8.7% annually.

"Economical coal," as used in Fig. 1, means coal that can be mined at a cost up to three times that presently prevailing. This would mean over a dollar per million Btu, or over 10 mills per kwh for fuel alone. This figure may be compared with a fraction of a cent per million Btu, which is the fuel cost of uranium.

Of the total recoverable uranium in the world, about 10% is expected to be found in the United States. In addition to the uranium available in the earth's crust, an amount some hundred times greater exists in the oceans at a concentration of approximately 1.5 parts per billion. Methods may be developed to recover part of this supply as well, and the cost of recovering it is expected to be far less than its fuel value.

This optimistic estimate of nuclear fuel reserves requires that so-called "breeding" be achieved.

Nature of Atomic Energy

In order to explain breeding and its vital importance, it will be necessary to discuss briefly the nature of atomic energy. Natural uranium contains two principal isotopes. One of them, U235, is the only naturally occurring material that will support a nuclear chain reaction. This reaction is initiated by a free neutron, which is absorbed by the nucleus of a U235 atom, making it unstable and usually causing it to fission or split into two major particles plus an average of 2½ free neutrons. These neutrons are available to cause fissions in other U235 atoms and so to continue the chain reaction. The machine in which this reaction is produced and controlled is called a nuclear reactor.

Only one of the 2½ neutrons produced by fission is required to sustain the chain reaction. The remaining neutrons are available to convert the more abundant isotope (U238) into plutonium, which is a man-made element and which will also support a nuclear chain reaction.

There are losses of neutrons. Some escape from the reactor and must be absorbed by the thick concrete radiation shield. Some are absorbed by structural materials in the reactor core. Others are absorbed by uranium 235 nonproductively; that is, without causing fission. The ratio of atoms of plutonium produced to atoms of U235 destroyed is defined as the Conversion Ratio. If this ratio exceeds unity, then the reactor is said to breed. That is, it is capable of producing more fissionable material than it consumes.

Importance of Breeding

Fig. 2 illustrates the importance of breeding. If the Conversion Ratio is zero; that is, if no plutonium is produced, only a maximum of 7/10 of 1% of natural uranium (which is the percentage of U235) can be utilized. As the Conversion Ratio approaches unity, all the atoms of U238 become available as a source of fissionable plutonium.

There seem to be good reasons for optimism on this vital point. A check run is underway at the Arco, Idaho, Reactor Testing Station. The so-called experimental breeder reactor was built there for this purpose. This reactor was the first to produce electricity from the atom, although in insignificant quantities. Far more important is the hoped-for experimental verifi-

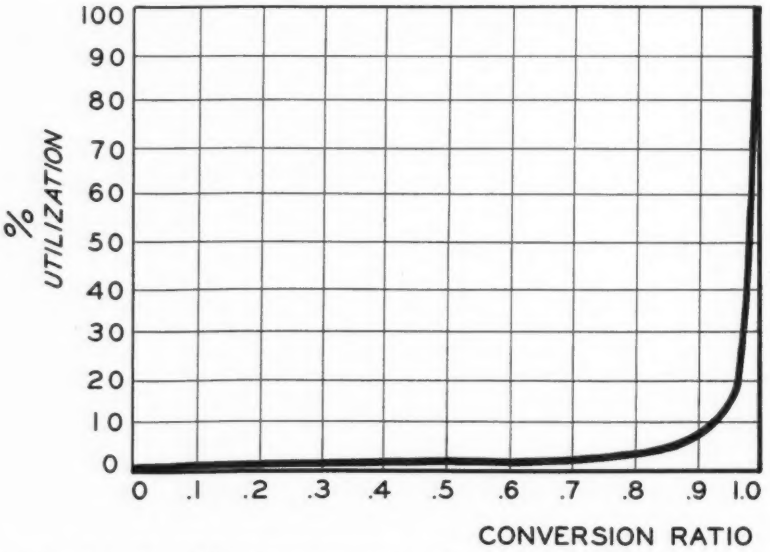


Fig. 2: Relationship existing between conversion ratio and utilization of natural uranium

cation of breeding, upon which the atomic age can be truly said to depend.

Atomic power plants as now visualized will operate on a heat cycle to produce electrical energy in the same way that chemical energy is now converted through a heat cycle to produce electrical energy. In the atomic power plant the heat of fission would be removed by a circulating fluid coolant, which in turn by means of a heat exchanger would transfer the heat to boiling water in the steam generator

Atomic Power Plants

An atomic power plant is one in which a nuclear reactor is substituted for the conventional steam generator. Fig. 3 illustrates three types of atomic power plants.

Reactor A is fueled with natural uranium. Heat is produced in the reactor and this heat can be made to produce steam to operate a steam power plant. The material leaving the reactor consists of plutonium, which is separated in the chemical plant; unchanged U238; some U235 which has not fissioned; and, finally, fission products. This is the dual-purpose plant concerning which a great deal has been written. This plant must simultaneously compete with two plants: Hanford, for example, producing plutonium; and a conventional steam plant producing electricity. Many people believe that a dual-purpose plant of this sort is the best first step to take in the direction of economic atomic power.

Evidently if reactor A produces more plutonium than the U235 it consumes in the fuel supplied it, it should be classed as a breeder. It then becomes possible to divert a portion of the plutonium produced, mix it with U238 which is now going to waste and substitute this fuel for natural uranium. The principal changes required to do this are in the chemical process. It must in this case be capable of separating uranium from the fission products. Also, a fuel-handling procedure adaptable to a plutonium-uranium fuel is required.

If the conversion ratio exceeds unity, after taking into account all losses in processing and handling, there remains an excess of plutonium, available for weapons production, or for fueling a mobile-type reactor of the sort illustrated as reactor B.

This is fueled with substantially pure U235 (or plutonium). Since there is no fertile material, there can be no production of new fissionable material. Excess neutrons produced in such a reactor are necessarily absorbed by the surroundings or by so-called poisons in the reactor itself. This reactor can be made quite compact since it requires but a small amount of highly concentrated fuel in order to function, that is, in order to become critical. Such reactors will become economic for propulsion of non-military craft only when large-size breeder reactors are operating, producing the required fuel.

Reactor C, as far as we can see at the present time, operates on the ideal cycle for a power producer. By recirculating the fuel it theoretically becomes possible to utilize it completely, at the same time producing sufficient new fissionable material to support the operation. In a reactor of this kind raw fuel cost becomes insignificant. The economics of this system depend to a considerable degree on the cost of fuel preparation. If fuel can be utilized in the form of a solution or slurry, this element of cost also would become relatively unimportant.

Economics of Atomic Power Generation

Next it is desirable to discuss the economics of atomic power generation against the background of its present-day competition. On p 67 is an artist's drawing of Pittsburg steam plant, which is Pacific Gas and Electric Co.'s most modern and most efficient steam electric plant. Pittsburg will go on the line in the spring of 1954. It will consist initially of four turbine-generators, each rated 156,250 kw, making a total gross capability for the station of 625,000 kw. There will be four boilers, each capable of delivering more than a million pounds of steam an hour at 1,800 lb pressure and 1,000° throttle temperature, with reheat to 1,000°. The estimated station net heat rate at maximum load is 9,550 Btu/kwh.

Fuel for these boilers initially will be oil or natural gas, but provision is being made in the design for future conversion to pulverized coal, if that fuel should become economic in California. A considerable portion of the property is set aside for fuel-oil tanks and for the future coal pile.

The steam generating part of such a plant, including boilers and auxiliaries, fuel storage and handling facilities, and stacks to dispose of the waste products of combustion, that is, that part which delivers steam to the turbine throttle, accounts for about one half the total cost of the plant. Turbine generators, condensers, pumps and heaters, transformers and switchgear, in substance that part of the plant which utilizes the steam and converts its energy into electricity, accounts for the other half. Assuming these ratios to hold for Pittsburg, with its estimated total capacity cost of $75,000,000, steam generation would cost $37,500,000 and steam utilization would cost $37,500,000.

The total annual cost of operating the steam generating part of Pittsburg steam plant, including some $8,000,000 for fuel, including operating and maintenance manpower and supplies, including allowance for depreciation, and including insurance, property and income taxes, and return on investment, is estimated to be to the order of $13,000,000. This is the amount of money that will be spent annually to supply steam at 1,800 lb and 1,000°. If atomic power is to compete it must do at least as well.

Fig. 4 indicates the limits that this requirement places on atomic power. This method of presentation first was used by Walker L. Cisler, president of the Detroit Edison Co., in a talk prepared for the Fifth Annual Summer Institute of the University of Michigan.

First, at one extreme, suppose that a device be substituted for the boiler plant that will continuously produce steam during the economic life of the plant, without requiring any expenditures for fuel, operation or maintenance. Assuming fixed charges at 12½%, the most that could be spent for this device is a little over $100,000,000. This amounts to $172 for each kilowatt of plant capability. It is interesting to note, for comparison, that the total estimated capital cost of Pittsburg amounts to $120 a kilowatt, and that the steam-producing half of that is $60 a kilowatt. So there is a 3-to-1 break-even point.

The other end of the solid line of Fig. 4 indicates the maximum that could be spent for uranium, ready to use, assuming it can be burned up completely. Here nothing is allowed to build or operate the reactor, but each year all of the $13,000,000 is spent for fuel. This would justify a price of $16,000 for a pound of uranium. Remember that this price is based on operating a breeder. If only the U235 were consumed, the price

Atomic Power Plant Design Considerations

Starts on Page 67

would have to be about 1/140th of this, or $115 a pound. (Incidentally, operating as a breeder, the plant would require 830 lb of uranium each year.)

Sixteen thousand dollars a pound is a lot more than uranium costs at the present time. In a recent article in *Electrical World*, Dr. Zinn, who is the director of Argonne National Laboratory in Chicago, used the figure of $35 as the cost of a pound of metallic natural uranium. This was not stated to be the price, but is probably a representative figure.

If operating and maintenance costs are assumed to be the same for the reactor as for the steam-producing half of Pittsburg, then the lower dotted line of Fig. 4 applies. Although such costs for atomic power plants may well be higher, particularly for the first plants which will be built, Fig. 4 does indicate the relatively small influence of operating and maintenance charges and points up the dependence of cost of power generation on fuel and fixed charges.

To make available the vast resources in our nuclear fuels it is most desirable to put atomic power plants into operation as soon as possible. On the other hand as shown in Fig. 4, the limit which must be placed on the cost of such a plant, if it is to be competitive with chemical fuel, is a drastic one. To help evaluate the magnitude of the problem of building an economic power plant, it is profitable to review the engineering development that must be done before such a plant can be designed.

Basic Atomic Power Plant

The atomic power plant, as it is now visualized, will work through a heat cycle to produce electrical energy in the same way that we work through a heat cycle to produce electrical energy from chemical energy. The basic atomic power plant working on this principle is illustrated in Fig. 5. In this plant the heat of fission is removed by a fluid coolant, which in turn transfers the heat to boiling water in the evaporator. The coolant is circulated by a pump and an expansion chamber is provided to take

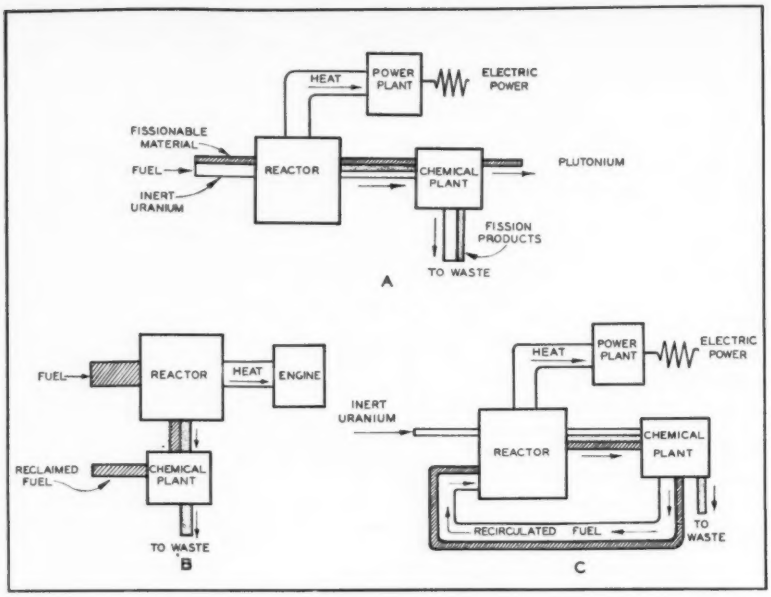


Fig. 3: Schematic of three kinds of nuclear power plants. At A is shown a dual-purpose power and plutonium plant. B shows a propulsion engine. C is a homogeneous reactor plant

care of changing temperatures.

The principle problems associated with the design of this plant can be listed under the following headings:

1. Nuclear design
2. Radiation hazards
3. Form of fuel
4. Heat transfer and choice of coolant
5. Control
6. Pumping
7. Materials of construction

The first problem in the nuclear design of a power plant is to produce a chain reaction in the pile. The fission of a uranium nucleus produces an average of about 2.5 neutrons. Some of these neutrons strike other uranium atoms and cause them to split. Some strike other atoms and merely change their atomic weights without splitting them and still others escape from the reactor without hitting anything. To maintain a chain reaction then, it is merely necessary to put enough fissionable material in the paths of the neutrons to be sure that the desired collisions result. The percentage of neutrons that escape from the pile can be reduced by making the pile larger. If the pile is large enough and the concentration of fis-

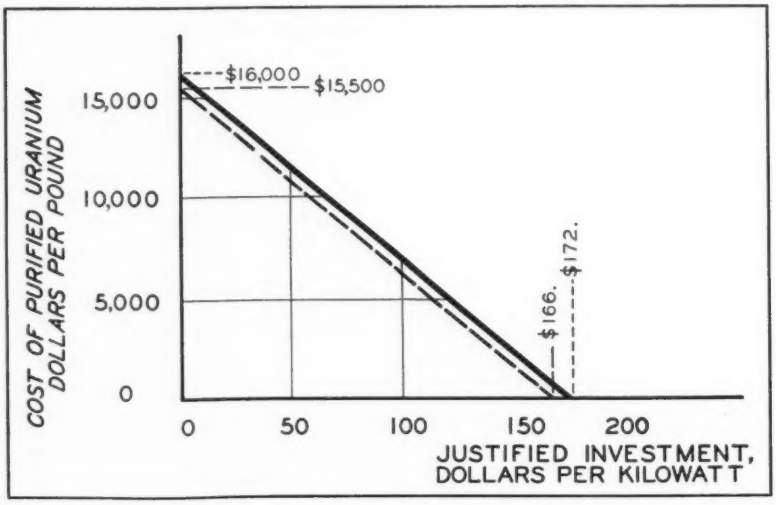


Fig. 4: Justified investment in nuclear power reactor (625 mw, 70% capacity factor)

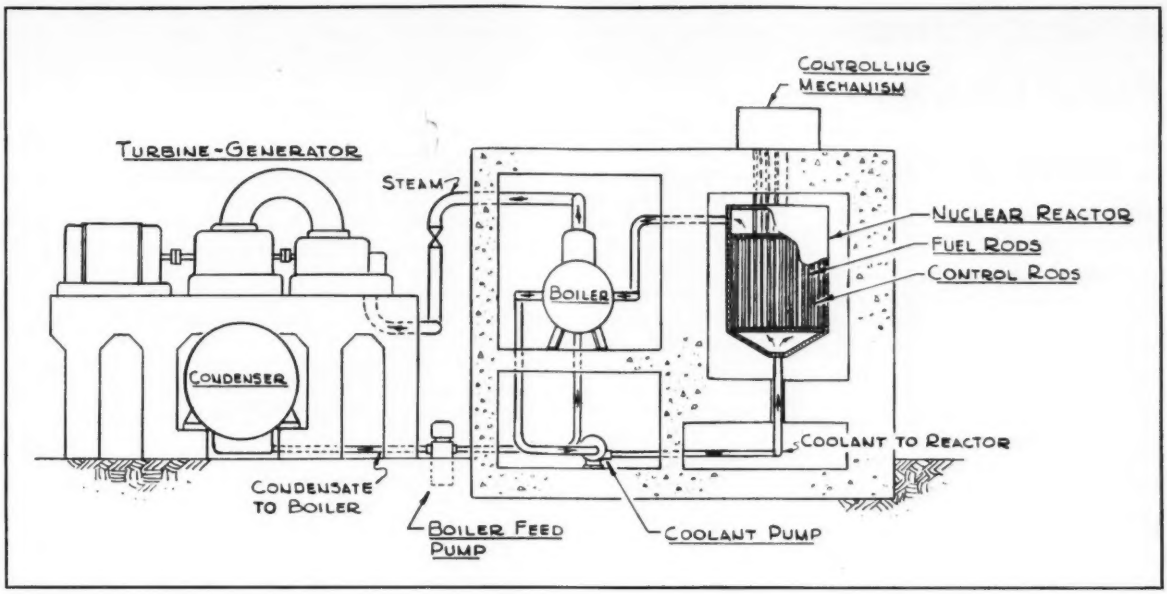


Fig. 5: Diagram of nuclear power plant showing reactor, boiler, coolant circuit, arrangement of pumps and electric turbine-generator

sionable material is great enough so that 40% of the neutrons produced strike fissionable material then we have what is called critical size.

It has been found that the speed at which a neutron travels greatly affects the probability that it will join with a uranium atom and cause it to split. If the neutrons can be slowed down, the fissionable material in the reactor becomes much easier to strike and much less of it will be required.

Consequently most reactors built to date have been of the *thermal* type in which the neutrons have been slowed down to velocities corresponding to the ambient temperature by allowing them to bounce around in a moderator such as carbon or deuterium (heavy hydrogen). In these thermal reactors it is possible to use natural uranium simply because the probability of fission being produced in the U235 atoms by thermal neutrons is great enough to overbalance the scarcity of these atoms in natural uranium.

Shielding Problems

The process of nuclear fission releases alpha, beta and gamma rays and free neutrons. All of these radiations can be injurious to personnel and provision must be made for containing them. The alpha and beta rays are both charged particles and can be stopped by a very small amount of material of any kind.

On the other hand gamma rays and neutrons have no charge, are quite penetrating, and can only be stopped by interposing large quantities of shielding material in their paths. In addition to the damage done by neutrons themselves they also have a property of transmuting other elements that they strike into radioactive isotopes. In other words, a material that has been subjected to neutron bombardments may become a gamma emitter and continue to be one for a period varying from a few minutes to thousands of years depending upon the material involved.

Gamma rays, which are essentially the same as X-rays, will penetrate material with steadily diminishing intensity. The mass of material required to reduce their intensity to an acceptable level can roughly be considered the same for all materials. The denser the material used for shielding, the fewer inches of travel will be required to obtain the desired reduction.

Lead is a very good shielding material for gamma rays. However, as mentioned previously, neutrons are stopped by bouncing against the nuclei in the material through which they pass and are slowed most effectively by a material of low atomic weight, hydrogen for instance. For a neutron shield, lead is quite poor while concrete with its water of crystallization is rather good. Concrete also has enough density to shield against gamma rays. For this reason shielding around a pile is generally constructed of concrete. It runs in thickness up to 10 ft or so.

After a reactor has been in operation all of the materials within the neutron field become radioactive and can be handled only by remote manipulation behind shielding. The parts of the reactor not in the neutron field such as the heat exchangers, pumps and piping do not become radioactive in themselves. However, they do become contaminated with the radioactive coolant so that they cannot be handled until they are thoroughly decontaminated by special cleansing operations.

Form of Fuels

The fissionable material within the reactor may be in almost any form. In selecting the particular form to be used consideration must be given to the problem of removing the heat of fission from the metal which, incidentally, has lower thermal conductivity than most metals. Consideration must also be given to the relative amounts of uranium, coolant and structural materials in the pile from the standpoint of criticality as discussed above. There is almost an infinite variety of forms that the fuel can take and no attempt will be made to describe any of them in detail.

Unfortunately uranium is readily corroded by most of the coolants that are used in a reactor and must be protected by a cladding material that is not only corrosion resistant but has a low capacity for absorbing neutrons. In a low-temperature thermal reactor this cladding material can be aluminum but at high temperatures it is necessary to use materials which resist corrosion and have a low capacity to absorb neutrons. Because fast neutrons

Atomic Power Plant Design Considerations

Starts on Page 67

are not so easily captured it is permissible to use other cladding materials in a fast reactor. Some of the fission products are gases and are, of course, radioactive. The cladding material must be capable of containing them in spite of any pressure that they might build up.

The fuel element is a manufactured article and its machining and cladding can represent a large portion of the cost of operating a reactor. Consequently a great saving could be made if the fuel were dissolved or suspended in the coolant itself as in reactor C of Fig. 3. This way to build a reactor offers a lot of promise from the standpoint of economics. On the other hand, it has some serious drawbacks in that all the piping, pumps and heat exchangers are subjected to neutron bombardment and can be considered permanently radioactive, so that they cannot be serviced except by remote means. Many of the solutions of uranium in the coolant are very corrosive and much research is required to develop acceptable solutions and structural materials. Use of reactors of this type for power generation is probably still some distance in the future.

Purpose of Coolant

The primary purpose of the coolant is to transfer the heat from the fuel elements to boiling water. It is obvious, then, that it must be a good heat transfer medium. But there is also the additional primary requirement that it must not rob too many neutrons from the fission process. Other desirable considerations are that it should be readily available, not corrosive to materials and should involve a minimum of special handling problems.

The three materials most generally considered as coolants are water, liquid metal and gas. For thermal reactors water is a surprisingly good coolant and it also serves as a moderator. Its biggest drawback is the fact that for operation at elevated temperature it must be maintained under high pressure to prevent its boiling and, even so, a power plant using a water coolant must operate at very low steam pressures (150-250 psig).

The metals that meet the nuclear requirements for a coolant are chiefly sodium, potassium and lead, straight or in combination. Because of the high freezing temperature of lead, sodium and potassium are generally preferred as reactor coolants. These materials have the drawbacks of (1) they freeze at fairly high temperature and (2) they react violently in the pressure of oxygen or water. Consequently the reactor design is complicated by elaborate provisions to prevent air or water coming in contact with the coolant during refueling and servicing.

The use of helium as a coolant has been given serious consideration because it is completely unaffected by neutron bombardment. In common with all gases it is a much poorer heat-transfer medium than either water or liquid metal. Its value as a heat-transfer medium can be greatly increased by operation at elevated pressures but this adds further complications in the design of the containing vessel and of the control rod operating mechanism. While helium itself is not affected by radiation, the contaminants that are inevitably associated with it do become radioactive and the problem of preventing leakage is as serious as with water or liquid metal. For these reasons it is not generally accepted as a coolant in a high temperature reactor for power service.

Pile Control

When exactly one neutron from each fission causes fission in another uranium nucleus the pile is operating at a constant level. If more than one neutron from each fission produces a new fission each time, there is a steadily increasing level of activity. The control of a pile then is a question of controlling the number of neutrons that are available to cause fission in the uranium. This control is accomplished by soaking up the excess neutrons in a rod of material that has a high capacity for neutron absorption.

The movement of control rods into and out of the reactor can be accomplished by servomechanisms receiving their motivating impulses from neutron-measuring instruments in the reactor and from power-demand signals from the steam plant. This question of control is not a great deal more complicated than is combustion control in our present steam plants except that the degree of reliability must be very much higher. The problem of getting the rod through the reactor container without leakage or excessive friction is a design problem that takes some serious thought.

The pumps to handle the coolant must be of special design to eliminate leakage of the highly radioactive fluid handled. Pumps also must be extremely reliable because of the difficulty of servicing them. Where water or other nonconductive fluids are handled, a pump without a stuffing box must be designed. This can be a totally enclosed pump with the motor rotor or even the entire motor immersed in the coolant fluid similar to the hermetically sealed motors and compressors of the refrigeration industry. Where liquid metals are to be handled, pumping can be obtained by using a moving magnetic field in a pump where the fluid itself serves as an armature of the motor.

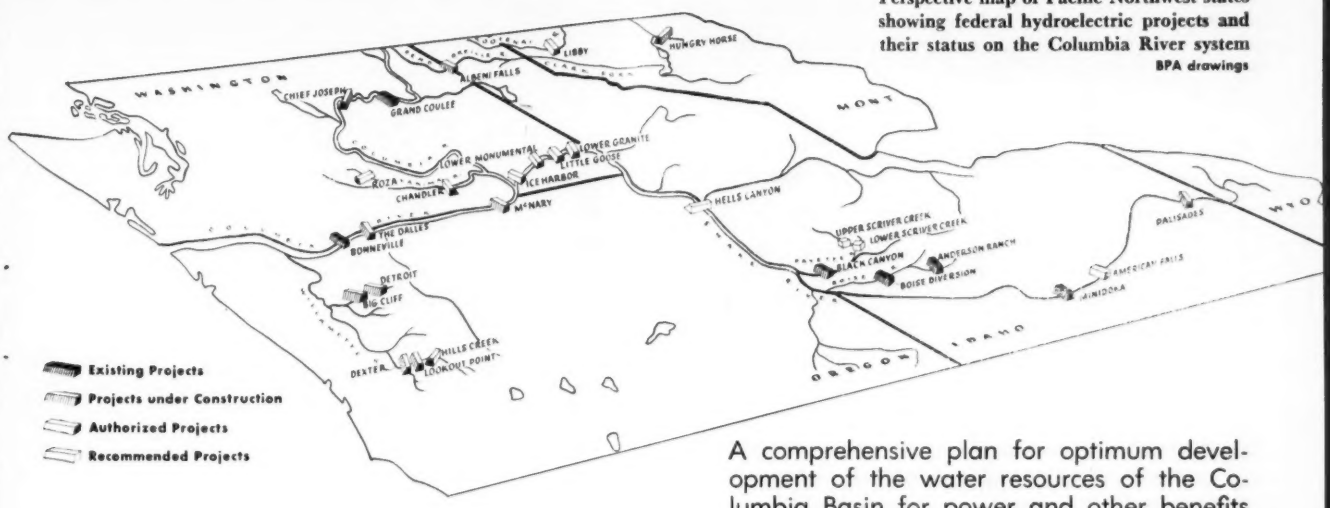
The materials of construction of a reactor must be chosen on the basis of high resistance to corrosion and low neutron absorption. Corrosion is of more concern than in most applications since the material in the reactor becomes radioactive and that portion of it which is dissolved into the coolant will precipitate in other parts of the system and greatly complicate the shielding and decontamination problems.

Economic Obstacle

The biggest obstacle in the path of development of atomic power plants is the fact that such plants must compete with fuel-burning and hydro plants that have the benefit of many years of development. Frequently a new product or process has the advantage of high prices for its output during the earlier stages of operation and this good income provides the funds for the development necessary to reduce the cost of production. This advantage is denied the atomic power plant because the kilowatt-hours produced have a value set by an established industry.

As pointed out here, the development costs and manufacturing costs of the first plant are bound to be high because of the technical difficulties involved and because of the high degree of conservatism in design made essential by the hazards of radiation. It is generally agreed that the present generation of reactors will not produce electrical energy at its present market value.

However it should not be concluded that because of this fact attempts to produce power from nuclear fission should be abandoned. The advantages to be gained from this type of power are so great that a way of financing the development will almost certainly be found.



Perspective map of Pacific Northwest states showing federal hydroelectric projects and their status on the Columbia River system
BPA drawings

A comprehensive plan for optimum development of the water resources of the Columbia Basin for power and other benefits

The Army Engineers' 308 Report

Col. T. H. Lipscomb
Corps of Engineers, Portland District

Over the years many groups and individuals have studied and promoted water resource development of the Columbia River. Some excellent and detailed reports have been made, but the most recent and the most comprehensive is the Corps of Engineers' 308 Report, which was completed after five years of study in 1948. Its objective was a comprehensive plan for the optimum development of the basin for flood control, power, navigation, irrigation and other benefits. In its preparation preceding reports were utilized to the utmost and other agencies made important contributions.

Power studies made during its preparation considered development of all feasible sites although only the most promising were studied in any detail. Regulation studies were made with numerous combinations of reservoirs, as the accomplishment of any one is measured by its contribution to the system as a whole, and any one will contribute differently as it is associated with different combinations.

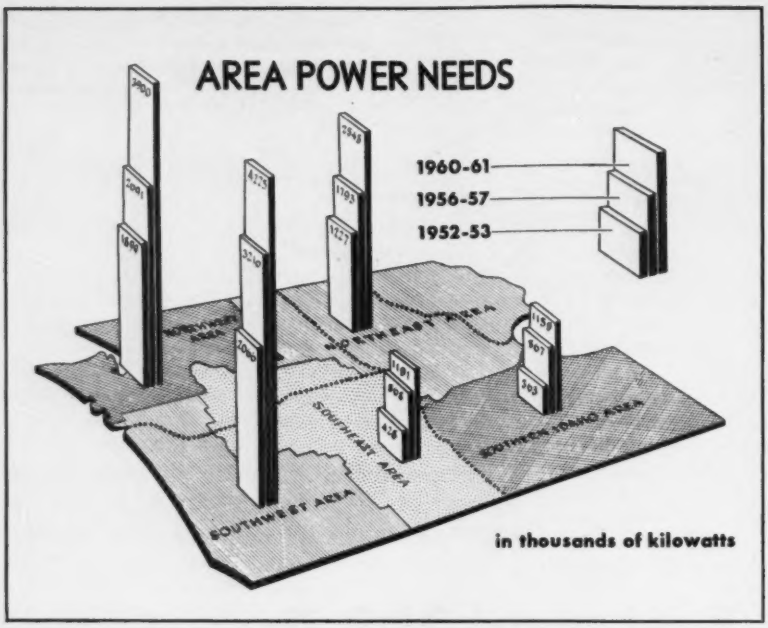
After regulation and cost studies were completed, each of the projects was reviewed in the light of its contribution to the integrated development of the region. With this as a basis, a plan was developed providing (1) adequate control for all floods that have occurred on the Columbia, (2) a fully developed inland navigation channel from Lewiston to the sea, and (3) an additional 6,500,000 kw of installed generating capacity to the previously authorized system, along with the necessary transmission facilities.

A balanced power system, plus the navigation requirement, necessitated the complete development of the lower Columbia below Grand Coulee, but it was possible to obtain the necessary upstream storage with about equal economy at various combinations of storage projects. The storage sites were scrutinized carefully, hearings were held with local interests, and those suitable sites that appeared to meet with the least opposition were included in the Main Control Plan, which was recommended for immediate authorization. At the time the report was submitted Bonneville and Grand Coulee Dams were in operation, Hungry Horse was under construction, and Chief Joseph, McNary and the four lower Snake River dams were authorized. Six additional major projects were recommended for authorization:

1. Libby Dam on the Kootenai River in northwestern Montana
2. Albeni Falls Dam on the Pend Oreille River in northwestern Idaho
3. Priest Rapids Dam on the Columbia River in Washington
4. Hells Canyon Dam on the Snake River in Oregon-Idaho
5. John Day Dam on the Columbia River in Oregon and Washington
6. The Dalles Dam on the Columbia River in Oregon and Washington
7. Glacier View Dam on Flathead River in northwestern Montana, or suitable alternate

Following this report, all were authorized except Hells Canyon and Glacier View and the federal construction program was accelerated. At the present time, construction is well under way on McNary, Chief Joseph and Albeni Falls and is just started on The Dalles Dam. These great projects will add about 3,000,000 kw of installed capacity and more than 2,400,000 kw of firm energy to the system by 1961. They will form the backbone of the program recommended for early development in the 308 Report.

But if the power requirements of the next 15 or 20 years are to be met, other projects will be required and orderly planning, design and construction must be continued. There are seven authorized projects for which no construction funds have been provided. This group includes the four lower Snake River projects, Ice Harbor, Lower Monumental, Little Goose and Lower Granite, as well as Libby on the Kootenai River, Priest Rapids



Estimated power requirements in Northwest by subareas based on December peak loads

downstream from Chief Joseph and John Day Dam, which will fill the gap between The Dalles and McNary Dam. This group of authorized projects will add another 3,963,000 kw of installed capacity to the system.

Nonfederal Program

Concurrently with the federal program for adding capacity to meet regional power load growth, the private and nonfederal public utilities are carrying forward an ambitious program that will add more than 1,500,000 kw to the region's installed capacity. Their program will almost double the present nonfederal installed capacity of the region and is scheduled to be completed in 1955.

Some of the projects, however, are meeting with opposition that is delaying the program. The City of Tacoma's 160,000-kw Mayfield project and its 300,000-kw Mossy Rock project are being held up by the conflict with fishery interests. The Portland General Electric Co.'s Pelton project is being held up for the same reason. These controversial projects represent 580,000 kw, or more than one-third of the total construction scheduled by nonfederal utilities.

The shortage of power that has been experienced in the Northwest for the past several years threatens to continue for some years more, and it will require the greatest effort on the part of all private utilities and public agencies to overcome the gap between generation and demand.

Over the past century the rapid growth of electric power in this region, as in others, has created many conflicts and problems. Solutions to many of these have been worked out over the years, but not without bitterness and some sacrifice in the process. The economic necessity for a certain degree of monopoly in public utilities, along with the abuses of some utilities, resulted in utility regulation laws being passed in the early days of the power companies. Holding companies took an active part in the industry's early growth, but the strong control exercised by these companies tended to move the function of management away from the service area and to make the management less responsive to the local community interests. An animosity developed which, coupled with other factors during the depression, forced a breaking up of the holding companies. As a result, management control was returned to the local utilities which were more responsive to local sentiment and more aware of the fundamental requirements of good public relations.

The assimilation of such a large and influential industry into the region's economic and political life has created strains and tensions, but over the years many of these have been resolved. The entrance of the federal government into the power generation field, however, has been relatively recent and many of the new problems, which its presence has created, have not yet been resolved. Other problems have resulted from the tremendous growth of the population and commerce of the region, which have been stimulated by World War II. I am going to outline some of those problems that deserve the sincere attention of responsible people in the Northwest and that require solution if the region is to continue its present vigorous growth.

Our optimism about the region's future growth is founded in large measure on the popular conception of a practically inexhaustible power potential of the Columbia River. If that is an important consideration in our future, it would be well to examine critically the means of developing that potential. In preparing the 308 Report, a phase F stage of power development was considered, which I think included the hydroelectric development of everything but Multnomah Falls. The phase F stage of development is very nearly the ultimate potential of the basin and has a firm capability of roughly 33,000,000 kw. Roughly, 125,000,000 acre-ft of storage is required to develop that power and as the ultimate total storage is reduced, so too is the potential.

With the river fully developed as run-of-river projects, but including the present storage projects only, the firm capability would be less than half the potential, or about *14 million* kw. If, therefore, the load is to continue to grow, storage sites must be developed—not only for the power developed at the site of the project but also for the power developed by the increased usable flow through every downstream project.

Use of any particular site for storage inevitably raises objections. Almost any reservoir damages some groups, as do most other developments such as highways, railroads, airports or industrial expansion. The longer the construction of the reservoir is deferred, the greater the damages that are sustained. In the interval towns grow, roads are built and farms are developed within the reservoir area that must be inundated.

The good storage sites with the least objections were recommended in the 308 Report, but even some of these are now being opposed. Some of the good projects that were not included in the master control plan because of strong opposition are: Boundary on the Pend Oreille because of zinc-lead mines in the reservoir; Paradise on the Clark Fork submerged the least cultivated land of any project in the area, but was strongly opposed by local residents and business people in Montana; Glacier View inundated part of Glacier National Park and was op-

posed by the Park Bureau of the Department of the Interior; Springston on the Coeur d'Alene River would interfere with the mining operations of the Kingston-Wallace Mining District, principally because it extends over the Osburn Fault; Kooskia on the Clearwater would submerge four small communities, some Indian lands and 4,000 acres of farm land in addition to requiring the relocation of the Trans-Idaho Highway.

There are some six other sites that are believed to be available without much opposition, but they total only 4,000,000 acre-ft of storage and that is not nearly enough for either power or flood control. Storage sites are limited and are essential to a continued economic development of power, so that the problem of whether we are willing to reserve reservoir areas for hydroelectric storage projects and which ones we are willing to reserve must be faced squarely in the light of the region's future development.

A second problem, which must be faced in the near future, is that of supplemental steam generation — not supplemental in the sense of TVA where the program calls for the supplemental steam being 50% of the total system generation by 1956. However, it must be admitted that as the more economical sites are developed and only the less economical ones remain, cost of new blocks of hydroelectric power will rise and may in a few decades become more expensive than new energy from steam plants located near cheap supplies of fuel.

When that time comes the Northwest will no doubt lose its attractiveness to the large user of power. However, long before that time comes we will be faced with the fact that for firming up the system during critically low water years and for peaking purposes it will be cheaper to provide steam plants at the load centers than to add additional hydroelectric capacity and transmission lines.

There must be agreement on the time when supplemental steam is desirable, on the amount that is desirable and finally on who will build the steam plants. If they are built by nonfederal utilities, there remains the problem of cost accounting for steam plants under nonfederal ownership operating to firm up federal hydro.

A third problem is the role of private and local public agencies, as against the federal government in the development, transmission and sale of hydroelectric power. This problem will be a continuing one and currently has several specific points of contention.

Hells Canyon

At Hells Canyon on the Snake River there is the conflict between Idaho Power Co., which is trying to get a Federal Power Commission license to build four run-of-river projects,* and federal agencies, which are trying to have a large storage reservoir authorized at the same location. This problem not only involves the Hells Canyon projects, but also the entire Columbia River system from the point of view both of downstream power generation and flood control. The transmission phase is also involved.

There are two questions relating to the sale of federally generated power that have not been resolved to the satisfaction of all the major interests affected. First is the discriminatory preferred customer regulation and second is the question of direct contracts with industrial users.

Cooperation Essential

A fourth problem, which includes the first three, is—How do we get out and stay out of the present power shortage in the Northwest? I will not try to answer the question but will give you some elements of the answer that I consider important. If the Northwest is to continue to great economic progress, the additional generation to meet the load requirement must be relatively cheap. The great quantities of hydroelectric power needed demand that the most economical sites on the Columbia and tributaries be developed as rapidly as possible under a balanced program that provides upstream storage as well as run-of-river plants. In addition the smaller sites close to the load centers must be developed.

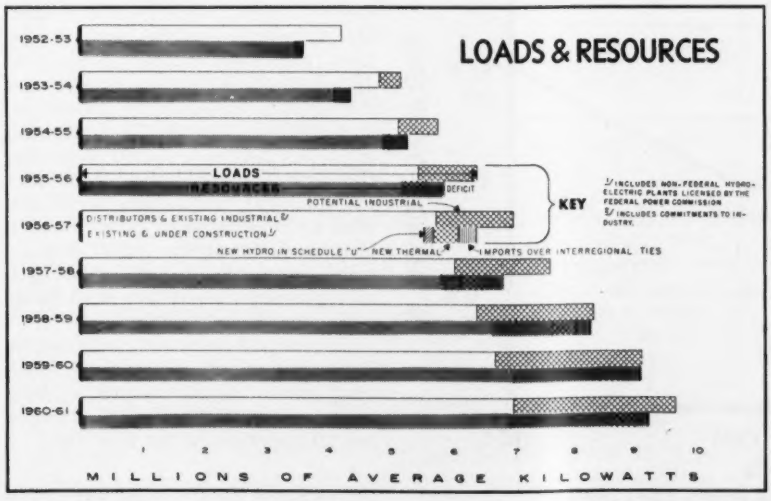
Financing the construction of the generating, transmission and distribution facilities for this new power involves tremendous sums of money. The major proportion of this money has been and no doubt will continue to be furnished by the federal government. However, considering the tremendous financial burden the country is carrying, it will be unwise to expect Uncle Sam to do it all.

If we consider the total proportion of the national budget for water resource development being devoted to meeting the needs of the Pacific Northwest, we have to admit we're being treated pretty well.

Continuation and extension of the federal support should be justified by a demonstration that the private enterprise and state and local governments of the region are doing those things that are within their ability to contribute to the solution of the regional problem. "We must all hang together or we'll hang separately."

The history of a Century of Power in the Northwest is an inspiring story of the ruggedness, independence, resourcefulness and willingness to cooperate on vital issues that made our country great. We are fortunate in that the blood of the last and most resourceful of the American pioneers flows in the veins of most of our people here. The decadence that has infected many parts of the world has not gained a firm foothold here. Therefore, though we cannot foresee all the future will bring, we can face with confidence the *next* Century of Power in the Northwest.

* Editor's note: Under amended application Idaho Power would build three dams, one having storage of over 1,000,000 acre-ft.



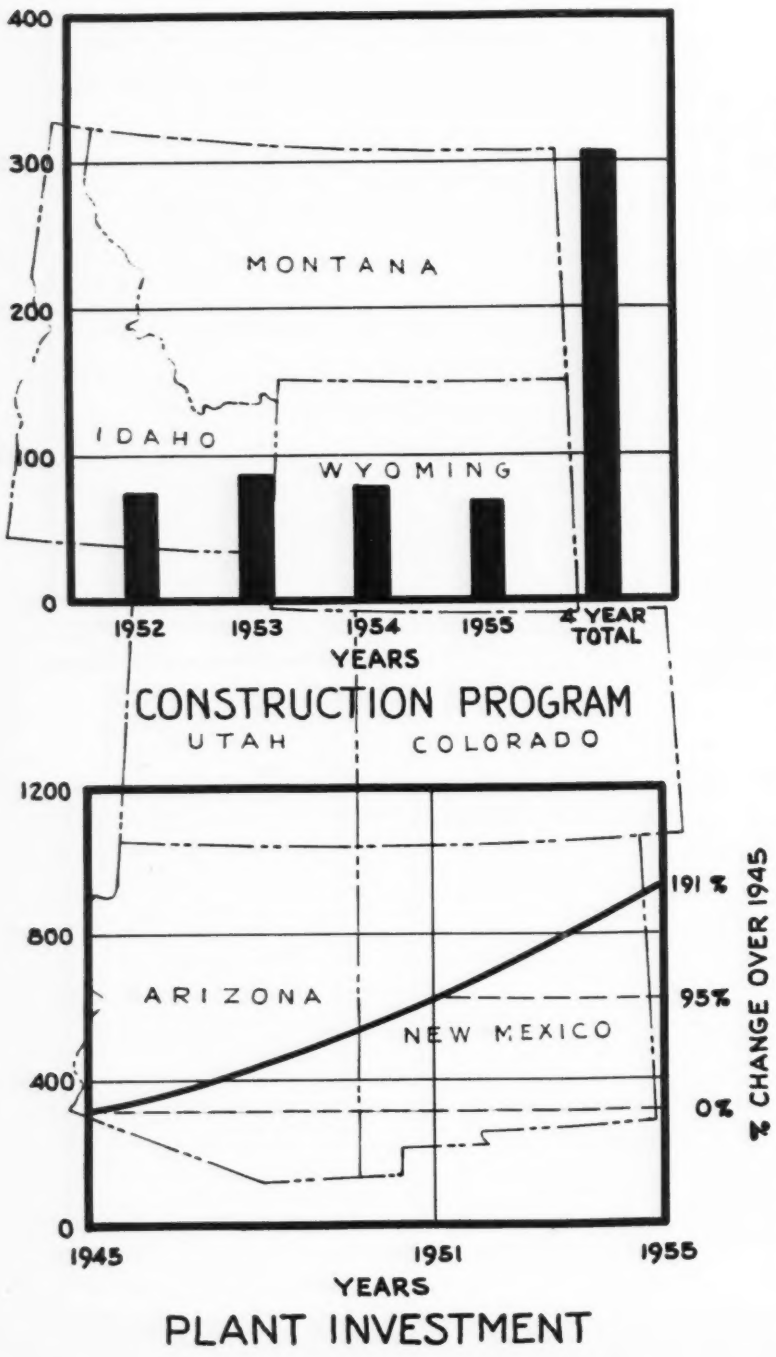
Loads and resources averaged over storage drawdown season—minimum year hydro

Power Unlimited for Rocky Mountain Area

To meet 1970 area power needs will require
6,400,000 kw more than 1950 demand*

L. R. Patterson

Superintendent Electric System Planning
Public Service Co. of Colorado
Denver



During and since World War II there has been a tremendous growth of both population and electrical energy requirements in the seven-state Rocky Mountain area. It is the purpose of this discussion to show what the private power companies of the region are doing in the way of long-range planning to meet future load growth.

From 1940 to 1950 the population of the seven-state area comprised of Arizona, New Mexico, Colorado, Utah, Wyoming, Idaho and Montana increased 21.7% or at a rate 50% greater than that for the continental United States as a whole. Growth in the larger metropolitan areas was far more spectacular. Albuquerque grew nearly 175%, Phoenix 77%, Denver 37%, Salt Lake City 30%, Boise 30% and Cheyenne 41%, to give a few examples.

Electric utility growth in these states was at an even greater rate. From 1940 to 1950 the total number of electric customers of all classes served by all agencies increased from 841,540 to 1,438,986, a gain of 71%. Electrical energy sales increased 108% from 4.6 billion to 9.6 billion kwh.

State planners and public power advocates saw in this rapid growth a chance to beat the drums for public power. Here was an area where the Bureau of Reclamation was active and several multiple-purpose projects were already authorized. After World War II the emphasis in these projects was shifted from irrigation to power and a steady propaganda of impending power shortage was started. The story then began that the private companies did not plan far enough ahead and that at some distant future year a great crisis in electric power was imminent unless the federal government took over the construction of all future power generating facilities.

The actual facts are far different from the fantastic propaganda. Planning ahead in the electrical utility business is nothing new. Planning is not an invention of the New Deal.

* Abstract of paper presented before recent meeting of the Rocky Mountain Electrical League at Glenwood Springs, Colo.

Records will show that the utilities of the Rocky Mountain area have actuated plans resulting in a tremendous increase in power facilities and in electrical energy sold in the six-year postwar period 1945 to 1951 and that these utility companies have a vision that reaches 5, 10, even 20 years into the future.

For the purpose of this discussion there is presented a summary of answers to a questionnaire sent to the major utilities of the seven-state Rocky Mountain area as a part of the Public Information Program. The statistics used herein are taken from the answers of companies serving two-thirds of all electric consumers in the area in 1951 and whose total kilowatt-hour sales represent nearly seven-eighths of the 1951 kilowatt-hour sales of the area.

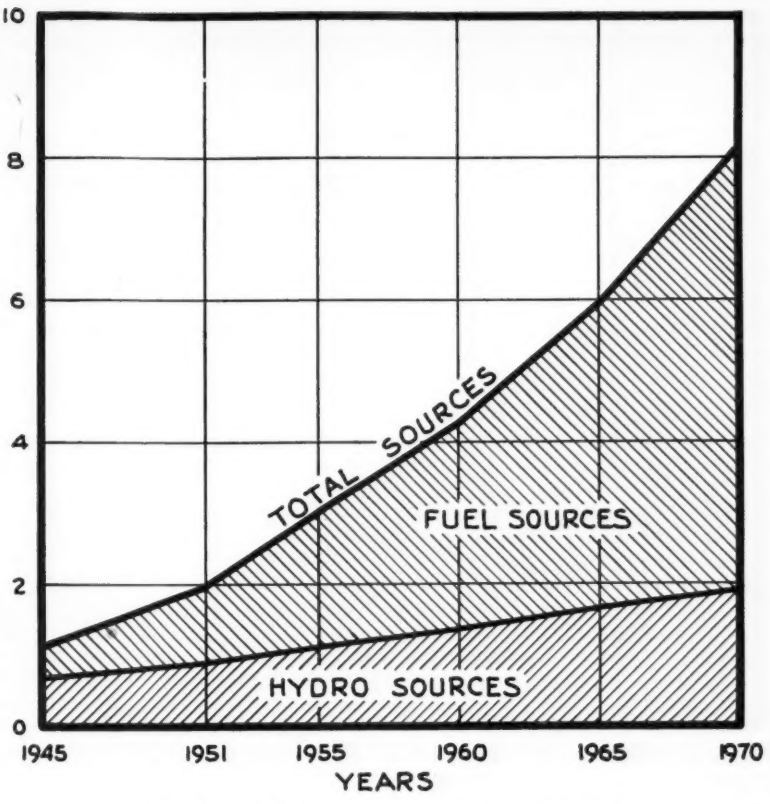
Physical Growth of Utilities

First, physical plant growth will be reviewed. This group of companies has done a great job. They have built a dozen entirely new power plants, built additions to 17 existing plants and added more than 40 new generators to their systems. The total generating capability of these companies increased 900,000 kw in six years to nearly double their combined capability at the end of World War II. Transmission lines built during these six years to get this power to load centers total 2,385 miles. Certainly there has been no lack of activity in transmission construction.

To construct all of these new facilities has required large sums of money. In the past six years the plant account of these companies has increased by over $300,000,000 or more than double the 1945 total. But the end is not in sight. The 1952-1955 construction program will require another $300,000,000.

What is the source of this money? Certainly the investor-owned utilities are proud that it is not raised by taxes. It comes from the American people who have sufficient faith and confidence in the free enterprise system, the American way, that they are willing to invest their savings in these companies. In 1945 there were slightly less than 69,000 preferred and common stockholders in these 20 utility companies. At the end of 1951 this had increased to more than 126,000. Of these stockholders 44,000 reside in these Rocky Mountain states. This is a tremendous vote of confidence in our companies.

Since the end of World War II the number of persons employed by our companies has increased from 8,000 to 11,500 and the annual pay rolls have increased from $18,000,000 to $43,000,000. Not only are these totals impressive but utility employment is steady and it carries with it many fringe benefits that contribute to the over-all community welfare.



Tax Burden

Any discussion of taxes is likely to bring forth a chorus of groans. However, it can be rightfully said that the private utility industry does not object to paying its fair share of taxes to support all levels of government. It wants the communities served to have good schools and other civic facilities. It does, however, object to competition from tax-free agencies building power plants with tax money contributed by its customers.

The utilities of this area carried a tax burden in 1951 equal to 25% of their gross revenue. This amounted to some $42,000,000 and was more than double the $20,000,000 of 1945. The $42,000,000 total was divided roughly $16,000,000 to state and local agencies and $26,000,000 to the federal government. Taxes allocated to electric operations in 1952 were equivalent to 3.67 mills per kwh sold. Certainly this is a heavy burden on our industry.

Long-Range Planning

What of the future? Do we have plans to meet the expanding needs that lie ahead? Can we raise the capital to carry out the plans?

The companies of this area have peered into the future—even as far distant as 1970. The electric power demand of 1970 is estimated at five times that of 1950. To meet this demand will require 7,900,000 kw of capacity and the annual electric energy use in 1970 will be 42 billion kwh. These are large figures and dwarf the 1950 demand of 1½ million kw and energy requirements of 8.9 billion kwh. Yet when the history of this industry is considered it must be admitted that these forecasts are realistic.

To meet the forecast requirements in 1970 much planning is obviously required. Those in the industry realize that long-range plans need only be general and tentative. Detailed planning is only required some four to five years in advance. However a long-range general plan is not only desirable but necessary if costly mistakes are to be avoided.

The long-range planner is con-

fronted by imponderables that could make him reluctant to plan very far ahead. Everywhere there is talk of production of electric energy by nuclear fission, or solar radiation or some other new technique. However, it is the opinion of the writer that any of these changes and advances will be more evolutionary than revolutionary.

Response to a questionnaire definitely indicates that the companies in this area are long-range planners. They have a vision of the future of this region and are preparing to meet requirements. Presently contemplated new plants and additions to existing plants will add 6,200,000 kw of generating capacity by 1970. Of this amount approximately 1,050,000 kw will be from hydro sources and the balance from fuel sources. To get this power to the load centers an additional 6,400 miles of high-voltage transmission lines are proposed. This program is predicated on the private utilities meeting their full load requirements without further federal power projects built by the taxpayers of the nation.

Consider the size of a 6,200,000-kw 19-year expansion program. This is equal to three Grand Coulees or it is equal to the combined ultimate installed capacity of the following federal power plants that are either in operation or under construction: Anderson Ranch, Black Canyon, Bonneville, Boysen, Canyon Ferry, Davis, Elephant Butte, Estes Park, Flatiron, Fort Peck, Fort Randall, Garrison, Grand Coulee, Green Mountain, Heart Mountain, Hoover, Hungry Horse, Kortes, Mary's Lake, Minidoka, Palisades, Parker, Pole Hill, Roosevelt, Seminoe, Shasta, Shoshone.

Think of all the ballyhoo that has surrounded this imposing list of plants. Why should we be less proud of our program than the federal government is of its? Surely we should not be accused of lack of vision.

Adequacy of Future Plans

Part of the proof of the ability of the industry in the region to plan adequately for the future has been shown by their new steam generating stations. New units are of the largest kilowatt ratings that can possibly be used on the various systems. Units now in process of installation run up to 66 and 75 mw ratings. Several units on order are in the 100-mw range. Steam conditions, likewise, are the highest that can be economically justified. Several new units are 1,450 psi and 1,000° total temperature. At least one unit utilizes reheat. Plant design has been carefully engineered to produce the lowest possible installation cost consistent with service requirements. Outdoor equipment is used in more and more installations.

In the field of hydroelectric generation the same trend has been observed, larger units and every possible economy in construction cost.

Transmission lines, likewise, show the long-range nature of the planning. In 1945 some 74% of all lines were 69 kv or less, 22% were in the 100- to 132-kv class and only 4% were 161 kv and above. In 1955 it is estimated that the 69 kv and lower classification will be 62% of the total mileage, 100- to 132-kv lines will account for 33% and 161 kv and above will be slightly above 5%. By 1970 only 60% of the transmission-line mileage will be in the 69-kv and below class, 30% will be in the 100- to 132-kv range and the 161 kv and above will have increased to 10% of the total. Thus transmission systems are being built to handle future loads.

Interconnections between systems also are being studied. Some ties have been made. In this way the companies are taking advantage of diversities in peaks, pooling of resources and economy energy.

Ability to Carry Out Plans

Can these companies carry through in raising the necessary capital? Here the industry can point to its past record as the best measure of the future. It must be remembered that these same companies have doubled their investment in facilities in the last six years. For the 10 years ending in 1955 investment will be tripled.

As long as our industry has faithful employees, efficient management and is not subjected to onerous or intolerable governmental regulation and restraint, it will be able to carry on its business in such a manner that the American people will supply the capital necessary for expansion.

With so much propaganda these days about the necessity for the government getting into the power business, it seemed we should review our accomplishments and our future plans. The record seems clear that we have met our responsibilities in the past and that we are adequately planning for the future.

Is the Home to Become a Substation?

"It is reasonable to expect that domestic use per customer can increase to as much as 25,000 to 100,000 kwh a year in the next 10 to 20 years. Domestic use, when fully developed, will create loads that will tax present distribution methods, probably far beyond their capabilities. All of this suggests that power companies must begin to consider the problem of distribution of electric service to residential customers at voltages greater than 110-220." So says Albert Gruber, industrial development manager of the Washington Water Power Co.

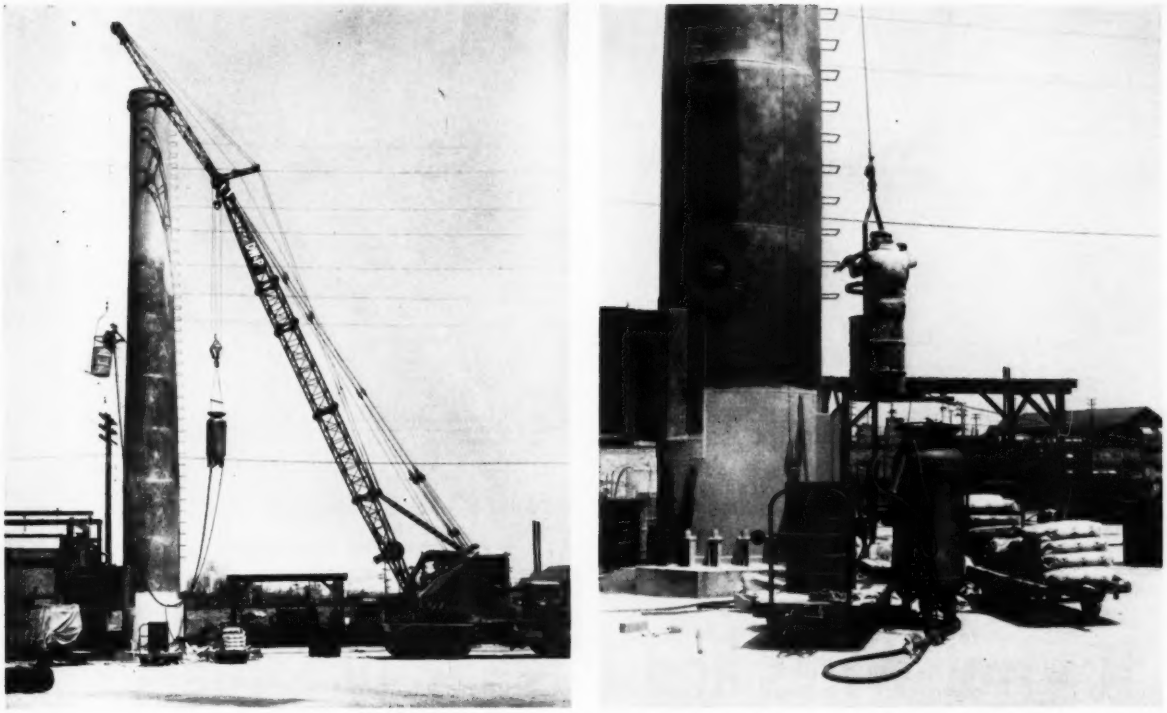
Present use of other voltages indicates the first steps to higher voltage would be either 2,300 or 13,000 v. These voltages could be delivered to residences safely with presently developed high-voltage cable from overhead primary circuits. The delivery point can be made either in outdoor or basement vaults or to self-contained load-center equipment.

A transformer would be required, preferably small in physical dimensions incorporated in a unit package that would include automatic primary protection, a distribution panel at 120-240 v complete with resetting breakers for branch circuits, range and water heater, and provided with meter loop, etc. This unit should be completely self-contained with the secondary circuits only available for inspection or repair by a wireman or the owner, but with the primary section available for inspection only to power company service employees.

Sizes would range probably from 3 to 10 kw in a single-phase unit and from 10 to 50 kw in a three-phase unit. These would provide four-wire delta or four-wire wye service to large residential loads where house heating was supplied. This unit should be moderately low in cost and would be owned by the customer.

High-voltage service would thus permit lower domestic rates because of delivery of power from primary circuits with the investment in large capacities in distribution transformers removed from capital account. Dry-type transformers would be preferable with all of the equipment installed in a compact fireproof metal container that in itself could be used as a vault.

This suggested solution to a growing problem is presented with the thought that the present residential distribution systems cannot meet the need when domestic consumption reaches the levels first mentioned.



Mobile crane permitted operator to work in most advantageous position and make quick work of job of sandblasting and painting stack

Large Crane Makes Big Utility Jobs Easy

Modern heavy duty construction equipment can effect savings for the electric utility comparable to those being realized in the general construction field. That at least has been the experience of the Los Angeles Department of Water & Power, reports Clayton M. Allen, engineer in charge of general plant division.

"The latest addition to our automotive and construction equipment fleet," says Allen, "is a diesel engine-powered, 45-ton, truck-mounted crane with various boom lengths ranging from 35 ft to a maximum of 158 ft, including the 25-ft jib." This Moto-Crane MC 824 was manufactured by the Thew Shovel Co., Lorain, Ohio. Capacity of the crane ranges from 45 tons with outriggers for the 50-ft boom, to three tons with the 138-ft boom, all ratings being 85% tipping. It is reported that there are very few of these cranes on the Pacific Coast and the Los Angeles utility is believed to be the first electric utility to make use of such a crane.

Special permits from the city, county, and state are required for its use throughout the system. Because of its maneuverability and variable boom lengths, as well as its large capacity, it is kept in almost constant use. Work includes the moving and erecting of transmission line towers, setting transformer banks and pouring concrete at the new Valley steam plant, as illustrated.

Sandblasting Latest Use

A rather novel recent use of this piece of equipment was in connection with sandblasting and painting the 60-ft high steel stack of a combination copper-insulation and rubbish-burning incinerator at the utility's operations center. The painting could not be performed in the usual manner, using spider staging swung from the top of the stack. The spider staging was not adaptable because the workman could not hold the sandblasting nozzle far enough away from the stack to be effective. Another problem was to raise the sandblast hopper to an elevation so that it worked efficiently without clogging the hose.

To do the job a mobile crane with a 50-ft boom and a 20-ft jib extension was used. The hoisting cable on the main boom was used to raise the sandblast hopper, and the hoist on the jib extension was used to hoist the sandblast machine operator. A 50-gal drum was rigged with a lifting bale and used to carry the workman aloft. By using a mobile crane with two hoists, the workman could be swung around the stack so as always to be working at the most effective distance for sandblasting.

The problem of lifting the sandblast hopper while in an elevated position was eliminated because as the sandblast hopper emptied it could be lowered to the ground and refilled. By using the crane, the rigging of staging and the handling time were reduced so that the job was completed in 22 hours.

Credit for the idea of using the crane for the sandblasting job and the working out of details and procedure goes to Frank R. Gould, shops superintendent of the Los Angeles Department of Water & Power.

At Los Angeles meeting—Weber, Davis, Wiseman, Schatzel, Smedley, moderator, and I. W. Borda, PCEA chairman, speaking on

Hot Wires and the Safety Orders

In a sincere effort to explain and demonstrate the scientific basis for the current-carrying capacity ratings for insulated wires and cables in the National Electrical Code two special demonstration meetings and forums were conducted, one in Los Angeles, Dec. 3, the other in San Francisco, Dec. 9. Reason for holding the meetings in California was that only in that state does a situation exist in which the major electrical installations in commercial and industrial buildings and places of employment are still under wire tables from the 1937 Code, which are still accepted in the California State Electrical Safety Orders of the Department of Industrial Safety. In the smaller sized conductors the difference between the NECode and Safety Orders does not now exist. Only in heavy service and feeder wires and cables does the disparity cause confusion and argument — the National Electrical Code tables derating the current-carrying capacity while the Safety Orders do not.

Long an advocate of uniform codes and wiring regulations as being necessary to orderly distribution of electrical materials, equipment and appliances, the Pacific Coast Electrical Assn. sponsored the meetings with some 32 co-sponsoring associations and organizations. All did so in the interest of finding facts and increasing knowledge of the behavior of wires and cables without committing themselves to any course of action. The problem had become controversial in California; this was an honest attempt to remove it from the realm of emotions and keep it in that of physical facts and phenomena.

Hence four national authorities from four of the nation's leading wire and cable companies were asked to present such facts and figures. As chairman of the PCEA committee making the arrangements, I. W. Borda, past president of PCEA, thus stated the purpose. He made it plain no action would be taken at these meetings. If the facts presented seemed to warrant a review and reconsideration of the wire tables, he said, then appropriate moves should be initiated through the proper procedures to ask for rehearings. This to be only after all who saw and heard had thought over, digested and come to sound conclusions as to what should be done. The audiences, both at the Southern California Edison Co. and Pacific Gas and Electric Co. auditoriums, were about 300, consisting of engineers of both municipal and private power companies, industrial concerns, consulting engineers, inspectors, contractors, manufacturers' and distributors' representatives and members of the Division of Industrial Safety.

Considerable demonstration equipment was shipped out from the east for the meetings. E. W. Davis, director of engineering, Simplex Wire & Cable Co., especially, used extensive equipment in carrying on a continuous loading test. In a cabinet simulating a building partition he had 3-in., 4-in. and 6-in. conduit in which were run conductors of large size and made to carry the current ratings, first of the National Electrical Code, then the increased current rating of the Safety Orders. There was installed an extensive system of thermocouples by which the temperatures of the cables, conduits and ambient surroundings could be measured. Readings were magnified and projected on a screen at various times throughout the day to let the audience see the temperature rise under such loading.

Davis explained the methods used in this test and in a smaller test to show the heat that results from a larger number of conductors in a conduit. With charts he showed comparisons of the Safety Orders and NECode capacities for type R and RH wire insulation, the Safety Orders making no distinction between the two insulations; nor for ambient temperature or number of conductors in a raceway.

Dr. R. J. Wiseman, vice-president and chief engineer, The Okonite Co., reviewed the history of how the industry's experience had found its way into revisions of the National Electrical Code. He told how the earlier 1889 tests of Dr. A. E. Kennelly, which set

At San Francisco, the same panel of wire and insulation experts—Cyr, moderator, standing; Weber, Schatzel, Wiseman and Davis

an arbitrary limit of 150° F (65.5° C) as the temperature it was considered rubber insulation would stand, had been succeeded by a more thorough investigation started in 1931 and reported on in 1938. This had developed as a result of extensive tests carried on by S. J. Rosch, E. D. Youmans and G. W. Zink. Dr. Wiseman showed on charts the findings of that committee. It was because of these findings that the 1940 NECode had revised current-carrying tables and manufacturers had introduced a new heat-resistant compound for wires operating at higher temperatures, known as type RH.

Dr. Wiseman then told how a subsequent study concluded in 1944 had demonstrated increased temperatures because of mutual heating between conduits. His conclusions were that none of these data were taken into consideration in the Safety Orders, nor were compensating values for demand factor permitted. He also reviewed briefly European code ratings of conductors to show that European practice is even more conservative than American.

What temperature does to insulation was next covered by R. A. Schatzel, vice-president and director of engineering, Rome Cable Corp. With slides he illustrated the equipment used in making tests on insulating compounds and samples of wire to evaluate deterioration from weather and heating. Light and heat are the two agents that cause rubber to lose its elasticity. Since wires in conduit are protected from light but are in the presence of some oxygen, the tests made by Underwriters' Laboratories and those made for these two meetings were those considered pertinent. These latter tests had been made recently under controlled laboratory conditions, he said, as he reported the findings. These showed rapid deterioration of the rubber at the 85° C which cables carrying the full capacity of the tables in the Safety Orders would permit. Such rubber showed cracks in the insulation even with moderate bending. Condensation of moisture in conduits in which insulation thus cracked, it was his opinion, would cause electric current to short circuit and destroy the cable.

To bring a Westerner's observations into the meeting Prof. Charles F. Dalziel, University of California, was asked to report on his check of the test procedure while in the east as well as to tell what European code ratings are for similar wire sizes. As he had spent a year abroad on a Fullbright scholarship, he told of answers to a questionnaire he had sent to representative European engineers for data.

Howard H. Weber, general sales manager, wire and cable division, U. S. Rubber Co., concluded the first part with a plea for consideration of the data presented, which he reviewed and interpreted. In view of heavier and more sustained loadings than were common when the older wire ratings were permitted, he urged that the NECode ratings, the ambient temperature and demand coefficients and similar data be used in the Safety Orders. The importance of uniform acceptance, he concluded, means "manufacturers of wire and cable so design their products that they meet the requirements of the Code. Deviations in requirements cause confusion in the electrical manufacturing, contracting and electricity supply industries, to local industry generally, and to inspection and regulatory authorities . . . Wire tables . . . determine the design of connection facilities for all types of equipment . . ."

At each meeting an hour and a half was devoted to answering questions from the floor. At Los Angeles the moderator was A. B. Smedley, consulting engineer; in San Francisco it was William A. Cyr, associate editor, ELECTRICAL WEST. There were few questioning the test procedure or data but many protests were made that the increased copper called for in NECode tables has not been found necessary in actual installations because load factor and demand are seldom maximum and fully loaded circuits are rare. A. C. Blackman, chief, Division of Industrial Safety, pointed to these and the lack of any evidence of hazard to safety to persons in the Safety Order ratings over the years to justify a change in the law, which the Safety Orders are, as a part of the California codes. To make them conform to the NECode would require extensive revisions of more than the wire tables and a change in fundamental purpose from safety to durability of insulation. Others objected that to use the code ratings was complicated, requiring calculations for demand and temperature and theoretical unit load values whereas the Safety Orders were simple to apply and the diversity of load provided ample safety under average conditions. Others suggested both be revised and simplified, with a safety factor incorporated.

Grounding Rules and Size of Ground Circuits

1. Ground at power source only, or at each power source if more than one. Do not ground at load or points of power utilization. Note: Power source may be the point of generation if within the building or the point where purchase power enters the building.

2. On low voltage circuits pay careful attention to equipment ground impedance so as not to limit fault current below the value of the overcurrent device. Low impedance of the equipment ground system is more important than resistance to earth.

3. Ground at each voltage level. Refer to Rule 1 above.

4. Avoid a condition of having part of the system ungrounded. Ground at each major bus section, if it is possible to separate each bus section.

5. Do not ground generator neutrals solidly, except in the case of some low voltage generators where the generator manufacturer has furnished special coil bracing. This is owing to the characteristic low zero-sequence reactance of generators. On Y-connected generators use a grounding reactor on low voltage units and a grounding resistor on high voltage units.

6. All neutral grounded systems require the use of overcurrent devices on all phases. Only two O L relays are required on motor starters for they are for overload and not short circuit protection.

7. Where the system neutral is not available a grounding transformer may be used if it proves economical.

8. Avoid the use of a 3-phase, 240-v or 480-v delta connected system if possible. Where it exists use a grounding transformer or operate by grounding the corner of the delta.

9. The size of the service ground should not be less than 25% of the capacity of the main service.

10. The equipment ground impedance must be low enough to pass a minimum of twice and preferably three times the rating of the overcurrent device when impressed with the voltage of the system to ground.

Industrial Systems Should Operate Grounded

The trend definitely is toward the grounding of industrial power systems operating below 13,800 v. All such systems should operate grounded, using the best means adapted to the particular system. That statement was made by Eustace C. Soares, Industrial Engineering Services, New York, in a paper presented at the meeting of the International Association of Electrical Inspectors, Southwestern Section, held at Fresno, Calif., Sept. 20, 1952. Following is an abstract of Soares' paper:

The National Electrical Code clearly sets forth the scope of grounding, what shall be grounded and what is effective grounding. Summing up the NEC requirements it is found that grounding is required for the protection of electrical installations; circuits *shall* be grounded where maximum voltage to ground does not exceed 150 v; circuits *shall* be grounded where a bare neutral is allowed in the service cable; it is *recommended* that circuits be grounded where the voltage to ground does not exceed 300 v; higher voltage circuits *may be* grounded and, lastly, grounding shall be permanent and continuous and of ample capacity and of low enough impedance to conduct the ground currents that may flow and to permit enough current to flow to operate the overcurrent devices in the circuit.

It is well to make it clear that indiscriminate or improper grounding is not the answer and may even introduce undesirable features. For instance, if the frame of portable equipment is grounded and at the same time the neutral wire is grounded at the same point, that is, at the load, a fault developing at the portable device may cause undesirably large currents to flow resulting in danger to the operator. Such indiscriminate grounding introduces a hazard rather than the protection that was sought in the first place.

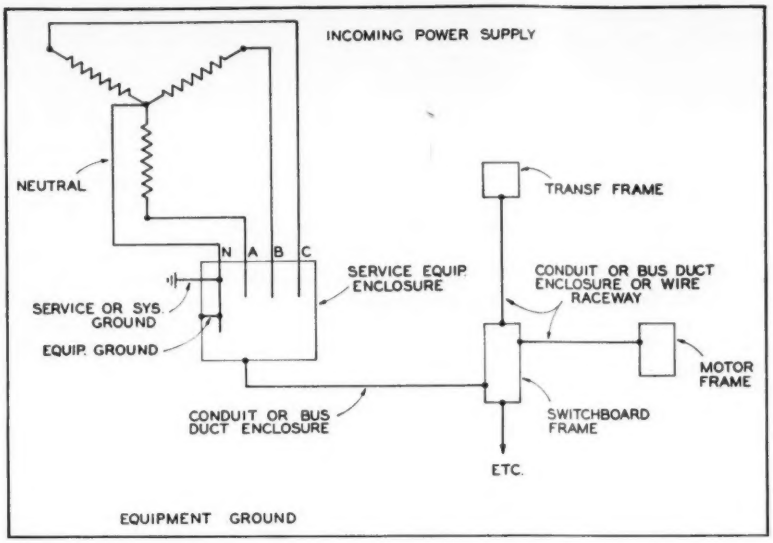
A clear distinction must be made in order not to permit an error in grounding to confuse the correctness of proper grounding. It would be just as logical to discard the use of electricity for any purpose because someone may be killed accidentally or because the state uses electricity for legal execution.

Another example of improper grounding practiced in too many cases is the use of one 500-MCM conductor in a conduit without bonding the conduit and conductor at both ends. If that is not done the impedance of the grounding conductor may be many times its d-c resistance, an impedance that easily may be sufficiently high to limit the fault current to a value too small to operate the overcurrent device. At present there is no definite requirement in the code to cover this point, a very important one as far as grounding is concerned. However, Paragraph 2,592 of the code does call for the conduit to be continuous and securely fastened to the ground clamp.

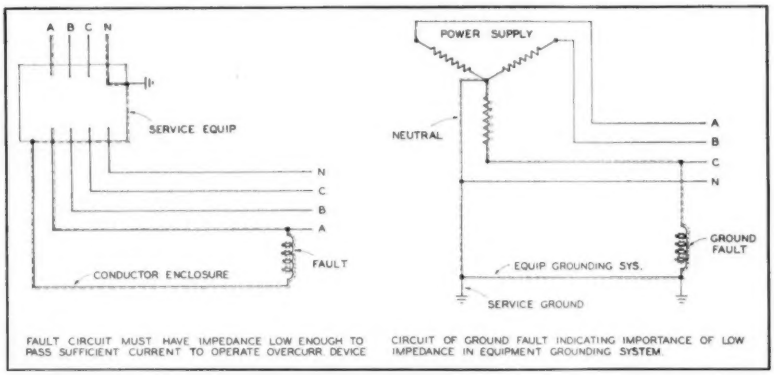
Summarizing, it is found that NEC makes the grounding of certain a-c systems *mandatory;* that it *recommends* that certain a-c systems be grounded; and that it *permits* the grounding of other systems without exceptions. The code also requires that equipment or conductor enclosures be grounded permanently and continuously and further states that the impedance of such circuits be sufficiently low to limit the potential above ground and to facilitate the operation of overcurrent devices in the circuit.

Two Types of Grounds

There are two distinct types of grounds called for by the code, the service or system ground and the equipment ground. The service or system ground consists of the definite intentional grounding of one conductor of the system. Usually the neutral point of the generator or transformer winding is selected. This grounding, depending on the type of system and voltage, may be solid or through a



Two types of grounds are called for by the code, the system ground and service ground



Equipment ground must be of low impedance to insure operation of protective devices

current-limiting device such as a reactor or resistor.

The equipment ground is a permanent and continuous bonding of conductor enclosures, apparatus frames and other noncurrent-carrying parts of the system. This would include conduit, motor and transformer frames, bus duct enclosures, etc.

Since there is an equipment and a system ground, both the equipment ground and the system ground will come together at a common point. Again it must be emphasized that the code requires that this equipment ground be of sufficiently low impedance to facilitate the operation of the overcurrent devices in the circuit.

Grounded and Ungrounded Systems

In a grounded system the neutral is at ground potential while in an ungrounded system if a ground develops the neutral is raised above ground potential and the other two phases are raised to full line voltage above ground. When a ground develops on an ungrounded system it must develop into a phase-to-phase fault for the operation of the overcurrent device. By the same token a grounded system with a high impedance in the ground return circuit will behave in a somewhat similar manner to an ungrounded system and some of the inherent benefits of such grounding is lost. In fact, the behavior would be worse and the likely damage to equipment much greater. Obviously, in a grounded system the equipment ground system impedance, not the impedance of the service ground, must be sufficiently low to pass enough current to operate the overcurrent device, otherwise the fault will continue and must develop into a phase-to-phase fault before the overcurrent devices will operate.

Thus the very important fact can be developed that an equipment ground bus system that has a low impedance between enclosures and frames of apparatus and the grounding point is more important than mere low resistance of the earth ground itself. However, this statement does not intend to belittle the value of low resistance of earth grounds.

This whole condition has been given proper cognizance by NFPA based on field experience with regard to small 15-amp circuits served by BX cable. The Underwriters' Laboratories in recent years has set up a requirement that BX cable armor (the equivalent ground return circuit) must have a maximum resistance of 1.5 ohms per 100 ft. To meet this requirement some manufacturers of BX cable use a bonding strip. This UL requirement was made only because in too many instances the fault current was too low to open the overcurrent device with resultant damage to equipment and property. Before the new requirement limiting the resistance of the armor in equipment ground system, the ground circuit was not of sufficiently low impedance to operate the overcurrent protection, in this case a 15-amp device.

Concept not Changed by Circuit Size

It is now time that similar recognition be given to the same situation in large capacity circuits. Some proper values must be set up to limit the impedance of the equipment ground system or ground return circuit. It is obvious that such values must be in the order of 1/100th of an ohm.

Size of the circuit does not in any way change the fundamental concept of electrical circuits where the impedance is the only factor controlling the current flow when the voltage remains unchanged. For instance, with the full 120 v available in a 120/208-v, 3-phase, 4-wire circuit a ground impedance of 1/100th of an ohm will allow 12,000 amp to flow. When joint resistance and impedance is allowed for and considering a 4,000-amp circuit with overcurrent device set for 5,000 or 6,000 amp the value of 1/100th of an ohm does not look out of place.

Of course the NEC has always made it clear that the equipment ground system should be of sufficiently low impedance. However the ruling is not being observed, not because of wilful neglect but rather from lack of appreciation of the problem. Since the Underwriters' Laboratories have now set specific values on the armor of BX cable, that phase of the problem is solved. Some values are set up in the code for smaller conductor enclosures but it is believed that these

values are in need of revision especially with regard to expanding the table for services above 1,200 amp, where the table now stops.

When, how and where to ground and what shall be the size of ground circuits are questions that can be answered by setting up a set of rules for grounding. Such a set of rules will be found in the accompanying box.

What the Engineer Can Do

Last, we come to what the engineer can do in the writing of specifications and what the electrical inspector can do in code enforcement to get proper grounding. It is suggested, especially in the case of low voltage systems, to cover grounding in more detail to assist the contractor—not just say ground in accordance with Art. 250 of the code. For instance, in large capacity installations the engineer should: require that conduit systems, at least major runs, be made up with red lead on the joints; specify the bonding of bus duct runs at each section with copper having 25% of the capacity of the main circuit; specify that grounding cables shall not be less than 25% of the capacity of the main circuit and similar considerations.

Equipment ground circuits should be studied carefully, especially where a long run of bus duct is used. It is suggested that in calculating the impedance of such circuits where magnetic material, such as steel, is used that a figure be used of ten times the d-c resistance to allow for all the variables involved.

By paying attention to proper grounding in industrial plants and to the designed impedance of equipment ground circuits we can raise the level of safety in the installation of power systems.

What Is a Good Electrical Inspector?

C. H. Hefner

Electrical Inspector, San Mateo County, California

An honest and sincere question deserves an honest and sincere analysis and answer. To a large degree this question relates to the person asking it and to his personal interest.

First, let us look at it from the standpoint of his employer. I believe the first consideration there is to receive an adequate service for the salary received. I believe that knowledge of his job, good public relations with the persons with whom he may come into contact, safe driving of his employer's automobile, good personal appearance and the fact that he is a public contact representative of that particular political subdivision have a strong part in determining value received. Willingness to do a job without the necessity of being a "yes-man" is, I believe, very important. In short, he must command a certain amount of respect, both from his employer and from his fellow employees.

Second, were the citizen and taxpayer-at-large to ask the question, because of the fact that good electrical inspection has a definite bearing on fire hazards and therefore on fire insurance rates, as well as on the general appearance of a community, the primary requirement would be one of firm and impartial enforcement, with no favors to a chosen few but equal advice and assistance to all within the limits of the law.

The next interested parties who might ask the question are the contractor and subcontractor. The contractors deserve a fair and impartial enforcement of the codes in order to make an intelligent bid on jobs. They deserve to know that the code minimums will be enforced regardless of who gets the job. The fact that no partiality will be shown will deter the chiseler from bidding low hoping to get by with inferior work. It will also eliminate the practice of bidding low hoping to load the job with future extras if caught short and claiming that this particular inspector is tough and that others would have passed the work as installed.

The fourth probable questioner might be the mechanic actually doing the work. His primary concern should be a fair and impartial interpretation of the codes. The mechanic has a duty to study and know his codes and take a reasonable pride in his workmanship and ability. The fact that it is his job should bring a certain amount of pride to the mechanic whether he be an apprentice or a journeyman, foreman or superintendent. Therefore he should feel that his work will not be rejected or criticized or actually reported to the contractor as noncode unless it is actually that and not because some inspector has a mistaken interpretation of the codes or doesn't take enough interest to find out the proper interpretation. He should also feel free to question the inspector as to what section of the code is being violated and receive a courteous explanation.

Next, one of the most interested parties is the owner of the building under construction or repairs. I believe he is entitled to a safe and adequately constructed job, without being forced to provide at extra expense something because it might satisfy the personal whim or prejudice of the inspector. He is entitled to minimum requirements of the codes and it is the inspector's duty to see that he gets this. Any extra requirements that might be in the specifications are the responsibility of the architect or contractor. I do not feel that it is fair for the owner to try to have the inspector force the contractor to install extras in excess of the code minimums unless safety is concerned. Then it is the inspector's job to express a fair and impartial opinion.

Now, last but not least, the inspector himself might ask the questions: how far to go, how hard to bear down, how lenient to be? These are big problems. In all humility the inspector must let the codes decide. His duty is to keep abreast of new developments, new and uniform interpretations and, regardless of how much he might be tempted, not to let personal likes and dislikes enter into his decisions. Because of the fact that he is no superperson he will make errors in judgment but they should be honest errors. If brought to his attention they should be acknowledged and corrected. He should not, however, change his opinion because someone else thinks differently but should always let the codes and ordinances decide.

An inspector must be fair to all.

ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

Short prediction

Since all the expert predictors seem to be sure that everything will be good for business in 1953, let's go along with that same prediction here. Both U. S. Departments of Commerce and Labor issued such a joint estimate for new construction in 1953, saying that a new peak would be reached. They foresaw expansion both in private and public construction. Private dwelling unit starts are expected to equal 1952. Commercial construction is expected to increase even if industrial expansion tapers off. Defense spending will taper off gradually but not enough to bring a slump the latter part of the year, they say.

Outlook is good

Year-end statements from NEMA and NAED are similarly optimistic and NECA echoes the same theme in its last bulletin. Electrical manufacturers count on big increases in electric power capacity by the utilities. Though industrial equipment sales may drop some, NEMA says that in lighting and commercial applications the markets have been held back during the Korean situation but materials are easier and business can go ahead now almost without restrictions.

Relax

A rather quick removal of controls is to be expected. In fact the bureaus in Washington are losing men fast, those on "loan" being anxious to go back to their own jobs, others feeling the controls are no longer so necessary. The "climate" of Washington is changing.

Stacked deal

Wage Stabilization was rendered a farce when President Truman overrode his board to make good on a deal with John L. Lewis over coal miner wage boosts. DiSalle has been trying to recruit some new industry representatives but who wants to be a dummy? The Construction Industry Stabilization Committee continues to function independently but its heart is hardly in it.

What price welfare?

Instead of wage increases which might bring public resentment the latest gimme gimmick is "welfare." That cloak hides the hike, they hope, and sounds good, makes opposing it seem so immoral even when arithmetic cold-bloodedly predicts it can't be supported. Eager insurance companies are fanning the flames to get this business. Bewildered contractors don't want it, foresee extra bookwork and difficulties, their employees not getting the money's worth of "welfare benefits," but feel caught in a bind. Already they have lost residential wiring to nonunion competition, are fast losing small repairs and alterations work to handymen because the rates they have to charge for labor are too high for such customers to pay.

Self-respect

As one contractor put it, "The union would be a lot wiser to stabilize wages at their present high and forget welfare. These high wages are supposed to permit a good mechanic to take care of his own welfare, not have to be carried through life socialistically."

Huddle

California Conference of NECA Chapters meets in Fresno Jan. 17 to hear a report from its committee making a study of welfare plans. It is likely to be a warm session. The IBEW locals have all been asking for a 7½c per hour welfare boost as though the steel and coal settlements had already guaranteed their getting one too.

Break in the dyke

In San Francisco, Local No. 6 not only asked the San Francisco Electrical Contractors Assn. for the 7½c welfare but, not to be outclassed by Oakland's Local 595, which has .06c more than the $3 per hour wage including vacation plan, now wants an additional 4% for what S.F. calls an "improved vacation plan." A recent increase was for vacation but was not set aside either by the association or the man himself so when vacation came he'd spent it. If granted this new scale would be $3.19½ an hour for San Francsico electrical workers and would open the flood gates for similar raises throughout the West.

Cooperate

San Diego Chapter, NECA, is helping its members by organizing a pool for rental of heavy equipment from each other as the need arises.

Big small business

National Electrical Contractors Assn. has finally received the green light from its members through its chapters to advertise and promote the business of electrical contracting like other businesses. It has taken a succession of efforts through some 25 years both to achieve the financial surplus necessary and the acceptance of its independently minded membership to spend it for advertising. Previous efforts have bogged down. The present program proposes national advertising in Business Week, Fortune and Wall Street Journal to reach business executives and build the prestige of NECA contractors to handle the important electrical installation work of the country. The program is designed to develop private enterprise business to replace the big defense and governmental works projects as these are finished. A large majority of the chapters voted to change their charters to pledge local business promotion activity in support of the national program. Kits are being prepared to guide local chapters in their tie-in efforts.

Liaison offices

Appointments from the West to the standing committees of NECA, made recently by the administrative committee, include: S. Halle, Colorado Springs, business development committee; C. A. Langlais, San Francisco, governmental affairs committee; E. L. Buttner, Oakland, research and education committee; C. D. Bronson, Oakland, and Bert W. Stiles, Denver, codes and standards committee. E. R. Cornish, formerly of Oakland, now NECA director of research and education, acts as secretary both for that committee and the one on codes and standards. NECA has also announced appointment of John L. Rose as field promotion manager.

New rules

San Diego Gas & Electric Co. has just issued to electrical contractors, engineers, architects and manufacturers of electric service equipment a new set of electrical service requirements.

Fast operators

Watch out for some of these high pressure "business survey" outfits, warns one prominent contractor who feels the slickers misrepresented themselves and failed to live up to their glowing promises. A check that should have been made first with the Better Business Bureau might have saved him money and a lot of difficulties.

Election results

Electrical Contractors Assn. of Santa Clara & San Benito Counties has elected officers for 1953, who were installed at the annual dinner dance, Dec. 12 in San Jose. Ed Kurze is president, Ray Rosendin, vice-president; Fred Heacox is secretary-treasurer, and directors are James Sardella, Charles Sanders, Louis Clausius, J. A. Puccinelli, Ralph Millard and Joe Santora Jr. Millard was president last year. George Harter is the association's manager.

Box war

No shortage of metal boxes, evidently, for there has been a price war going on. Could be selling below cost to record losses for recovery of excess profits from 1951 and not really cost reduction in manufacture.

New manager

Fresno Chapter of NECA has appointed Ray Buckley as manager to fill the vacancy made by the leaving of Stanley Ingraham. Buckley has been secretary of the local central labor council, was formerly in a similar capacity in Los Angeles; is a Loyola graduate in industrial relations and was a major in the Marines . . . The Utah-Idaho Chapter as yet had not decided upon an assistant manager to assist G. A. Howarth who has been recuperating from illness.

To publicize

Western Lighting Manufacturers Institute has been formed, with headquarters in Beverly Hills. It has appointed Daniel Rashall to direct a public relations program for these makers of commercial and industrial lighting equipment.

Visual code

Second volume of Segall's Electrical Code Diagrams is due to be distributed by McGraw-Hill Book Co. in January. It, like volume 1, will sell at $12.50, and will diagram and illustrate the National Electrical Code for ease in interpretation and proper installation.

Standards

ASTM standards on metallic electrical conductors and a booklet on a symposium on insulating oils are announced by the American Society for Testing Materials, and copies are available from the ASTM at 1916 Race St., Philadelphia 3. Price for the wire book is $3, the oil one, $1. Both represent the best data available on these materials.

Tour begins

Square D Company's display coach begins its Western trip in January. It will be in charge of Delwyn V. Lindfors, UC at Berkeley graduate, who has been with Square D since last February and formerly was in the Navy. The coach has been used in the East to show the company's complete line of distribution and control equipment to customers—contractors, architects, engineers, distributors, utilities and industrial accounts.

New district

General Electric Supply Co. has raised its Sacramento branch to a new district office, covering Stanislaus and part of Solano County and north. Edwin M. Ames has been made district manager. One of the company's two Sacramento warehouses will be modernized to get more office space. Len S. Oppenheim will be appliance sales manager and N. H. Fugelsang manager of supplies and apparatus; J. A. McGree is operating manager . . . In Los Angeles Paul Herbert was recently named sales manager of the building department.

Light on dates

IES Dates for the new year include: South Pacific Regional Conference, Los Angeles, April 9-10; T. H. Shepherd, Los Angeles Department of Water & Power, general chairman. North Pacific Regional Conference, Portland, April 23-24; Walter E. Potter, General Electric Lamp Department, general chairman. 1953 IES National Technical Conference, New York City, Hotel Commodore, Sept. 14-17 . . . Two new chapters were chartered in the West last year—in San Jose, Calif., and Vancouver Island, British Columbia.

News of folks

"Scuttlebutt" reported recently in the Southern California Section IES meeting notice includes: Frank Van Gilluwe, Holophane Co., has taken on an assistant, Joe G. Platt . . . Frank C. Zal, electrical engineer formerly with All Bright of Chicago and Underwriters' Laboratories is now with Light Control Co. . . . Floyd Crawford, formerly with Welborne Associates, is now affiliated with C. W. Cole Co. on sales . . . Lloyd C. Reuscher is the new manager of lighting fixture department of G-E Supply . . . Irving A. Bloch, formerly with Welborne Associates, now with Instant-Lite . . . Edwin F. Guth Co., formerly represented by Bill Bracken, is now with Wally Evans . . . James L. Edgar Sr., now with Gill Glass & Fixture Co. . . . Oscar Meissner, formerly with Ted Shepherd's illuminating engineering unit in the Los Angeles Department of Water & Power has taken a position as street lighting engineer, Bureau of Street Lighting, headed up by Bill Lauer . . . Gus Larson is the newly appointed Westinghouse Lamp Division engineer for the South Pacific district, succeeding Charles Long, who went to San Francisco . . . Charles Davidson, formerly with Light Control Co. and Supreme, is now with All Brite, and Charlie Shoolbred has taken a position in sales.

His own

R. E. McDonough has dropped the Monitor monicker for his manufacturers' representative business in Butte, Mont., and now calls his firm the R. E. McDonough Co., at 726 S. Arizona St.

Mass housing

Albert C. Martin & Associates have been appointed official architects for all future planning and building of Lakewood Center and Lakewood Park commercial developments just out of Long Beach, where over 25,000 houses are being built. A complete community center with civic offices and some 90 stores, including a huge May Co. department store, is being built . . . Interesting item: NuTone Inc. sold 25,000 chimes and transformers for the 25,000 houses in the project. Many will have fans and NuTone's Heat-A-Lite combination heater, fan and ceiling light.

Long needed

Binding screws are entirely eliminated in a new line of flush-mounted switches and outlet receptacles being introduced by General Electric Co. Internal pressure lock terminals take the place of binding screws. Conductor leads are stripped and simply pushed into the terminal holes on the back of the device. The pressure lock grips it. It will withstand a pullout test of over 75 lb for No. 14 wire. Equally firm electrical and mechanical connections are obtained with No. 10 and No. 12 wires and are fully insulated because totally enclosed. Wires can be released when necessary by pressing a small screwdriver into "release" slots. Fit standard outlet boxes; will all be UL labeled.

Better

Fuse labels direct machine printed on the barrel are replacing paper labels on all fuses made by Chase-Shawmut Co., the first to do so.

Still in force

CMP Reg. 6, with its Dec. 10 amendment, went into effect Jan. 1 to permit more copper and steel and a little more aluminum for construction of all types, even recreational and amusement and multiunit residences. Aluminum still is restricted because of the Northwest power shortage reduction in production but May 1 is given as the date for relaxation on aluminum. The amended order contains the former M-100 coverage of residential construction and extends self-authorization by the owner for larger amounts than previously.

West is important

The 1953 Electronics Components Symposium will be held April 29-30 at the Shakespeare Club in Pasadena, sponsored by the AIEE, IRE, RTMA and WCEMA. Last year's meeting was in Washington, D. C. Dr. A. M. Zarem, Stanford Research Institute, is general chairman.

Business building

In Spokane the Inland Empire Electrical League's supply and apparatus section chairman, Carl Hoffman, commercial sales department manager, Washington Water Power Co., reported the section's activity for the year brought an estimated $228,600 worth of new lighting during the 10-week "Election-Light Campaign." A total of 88 customers improved their lighting; purchasing 2,560 fixtures. Lighting to stores amounted to 342 kw, other types of business 298.2 kw, a total of 640.2 kw. In the earlier commercial cooking campaign sales of $40,000 resulted, plus wiring. In the air conditioning drive $200,000 in equipment plus wiring. Three meetings of contractors were held last year.

See and try

Electrical contractors division of San Diego Bureau of Home Appliances had 275 at its annual dinner and product showing. Forty manufacturers set up portable displays of wiring materials and products, which were viewed and studied prior to the dinner. Bill Cranston, president of Thermador, Los Angeles, and Dr. Oscar Kaplan, state college, talked.

Sample pays off

A model home, adequately wired and lighted according to the recipe plan, brought 868 prospects, of which 68 were planning a new home, and convinced a builder to feature adequate wiring for a 135-unit subdivision in Phoenix, the Adequate Wiring Bureau of Phoenix reported. The model home was jointly sponsored by the builder, electrical contractor, G-E Lamp Department, a furniture store and Arizona Public Service Co.

Wiring talk

National Adequate Wiring Bureau's 9th annual conference will be held in Chicago, La Salle Hotel, Feb. 26-27. W. R. Milby, Detroit Edison Co., is general chairman. The NEMA committee plans to step up its national advertising budget this year by 41%.

Always happens

Amusing incident at PCEA wire and cable forum—the program full of vice-presidents of wire and cable companies but no one had an extension cord to hook up the projector.

Latest

Practical Electrical Wiring by H. P. Richter in its fourth edition, with changes to meet the 1951 Code, is available from McGraw-Hill Book Co.

What's new?

Some interesting new devices recently developed include: A new line of turret-type fluorescent lampholders for single and bi-pin lamps has been brought out by Sylvania Electric Products . . . H. J. Theiler Corp. has a Feller feather-touch switch whose action is so light it can be flipped, silently, with elbow or arm . . . Edwin F. Guth Co. has a new plastic louver called GrateLite for fluorescent fixtures, molded of styrene . . . a Chromalox blower-type electric unit heater is announced by Edwin L. Wiegand Co. for floor, wall or ceiling mounting, in sizes up to 20 kw . . . An ingenious Spring-O-Matic Powereel is offered by Industrial Electrical Works of Omaha to provide a retractable reel for portable cable up to size No. 4 multiple conductors . . . Thompson Electric Co. now makes a lightweight 3-lamp cluster suspension unit for use with either reflector lamps or conventional reflectors, strong enough to support three luminaires of up to 10 lb each, usable for industrial plants, hangars, gymnasiums, etc. . . . A marker for ceiling outlets which can be operated from the floor is an ingenious tool offered by Consolidated Industrial Electric.

Around the end

In a subtle move to circumvent NECA's drive to secure federal legislation to prevent bid shopping on federal jobs, the AGC has been trying to get electrical contractors into local construction councils.

It is high time to be pushing home lighting, says G. B. Buck, Public Service Co. of Colorado. He will do this with his new show . . .

The Magic Key to Better Living

Believing that now is the time to start actively promoting residential lighting, the Public Service Co. of Colorado has created a show, *The Magic Key*. The production, consisting of two parts, was given its premiere showing at the recent convention of the Rocky Mountain Electrical League at Glenwood Springs.

It consists of two parts that may be used together or separately, depending upon the audience and the objective. The first part, *Partners in Progress,* is of a spectacular nature and opens with a six-million-volt arc from a Tesla coil. Acts performed include: lighting fluorescent lamps by holding them in the high-frequency field; lighting a cigarette off a piece of ice; frying an egg on a steel disk floating in an intense magnetic field; turning lights on and off by breaking a light beam, and playing music over a beam of light.

The second part of the show tells the home lighting story in playlet form. A woman and her son use lighting recipes to produce better seeing in the home; a young lady power company home lighting adviser comes in to demonstrate the advantages of certified floor, bridge and study lamps, package unit fluorescent valance lighting, modern three-way dining room lighting, and other modern and dramatic uses of light in the home.

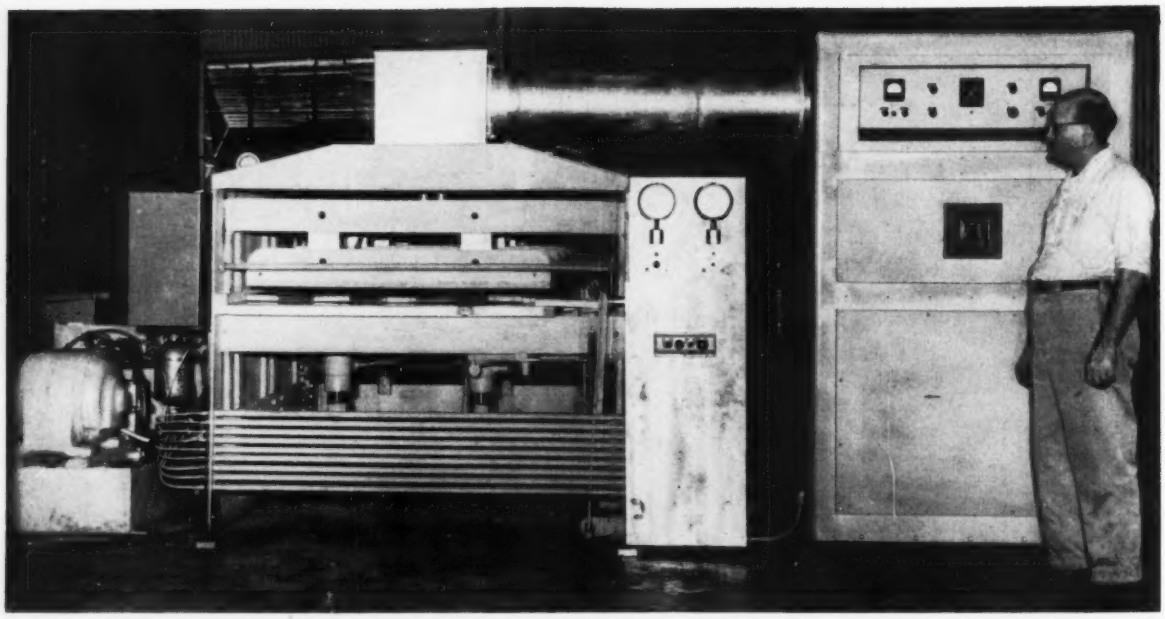
The skit is well done. It appealed to utility executives and sales people as a vehicle that can effectively be used in today's job of promoting home lighting. To the ladies of the convention it sold some ideas on home lighting modernization that will cost the men some money. That fact alone was proof that the story will go over well with the public.

Amplifying tick of a watch is demonstrated

The whole idea of *The Magic Key* was conceived by Gaylord B. Buck, vice-president and general commercial manager of the Public Service Co. of Colorado. He was farseeing enough to anticipate the day when executives may be sorely pressed for earnings on the inflated plant investment necessary in this postwar period. Since residential consumption and revenue are the least affected of all classes of business during periods of recession, and since home lighting is basic, Buck logically is directing major promotion to home lighting.

Partners in Progress, the first part of the show, as given at the convention, is designed for showings before civic clubs and men's groups primarily. The lighting skit, the second part, is aimed especially at audiences of women, PTA, clubs and the like, and will be used in the schools and in the power company's auditorium at its main office in Denver, each day, as well.

The accompanying photographs show a scene from each part of the Public Service of Colorado's show.

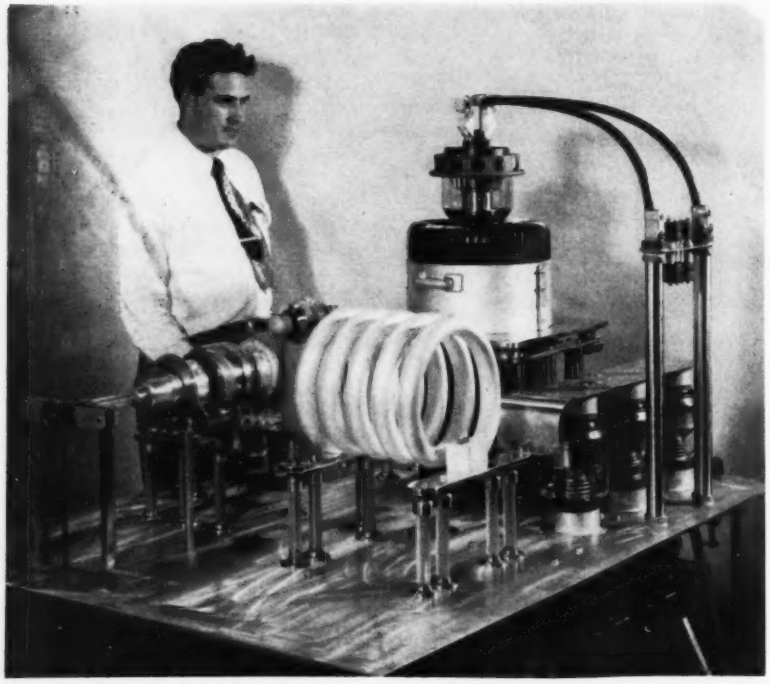


In this new automatic hydraulic press and electronic gluing production machine the lumber industry finds the answer to . . .

Making Small Trees Into Large Lumber

Lewis B. Reed

Industrial Heating Consultant
Los Angeles Department of Water & Power



Heart of new machine is this tank circuit coil, oscillator tube and vacuum condensers

The lumber industry is running out of big trees and as a result is unable to provide the type of lumber known as wide clears. With a large demand for wide clears, the Weyerhaeuser Timber Co. is preparing a production line for turning out fabricated stock. The process will be similar to the one used by furniture manufacturers in turning out core stock, using high-frequency dielectric gluing. Weyerhaeuser, however, is putting the operation on a semiautomatic mass production basis, with larger equipment to handle larger sizes of lumber. Producing wide clears in this manner will prove to be a boon to customers of the lumber industry as well as to the industry itself. This is because of the elimination of considerable waste that occurred in cutting wide clears and the possibility of making them from selected scrap. The customer also would benefit by getting a stronger piece of timber.

Heart of the production line for the process is the result of the cooperation of the PEECO Corp. and the Rialto Corp. Both are located in the Los Angeles area. Using their

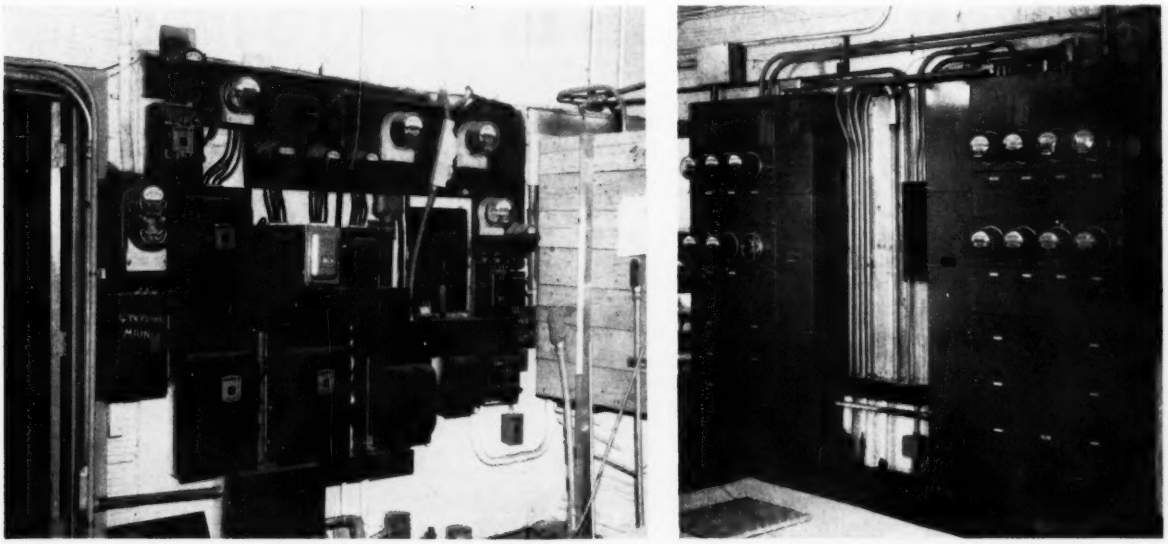
past experience in building similar machines for gluing core stock, they have built a larger press and high-frequency dielectric heater capable of producing a minimum of 2,800 fbm an hour. Kiln-dried lumber, sorted for size, run through a glue spreader and hydraulically assembled into a loose panel, will be ram fed into the press, which will take work up to 48 in. wide and 4 in. thick. By indexing the work through the machine, panels of any length can be made. After the glue has been cured the panel will pass through gang saws to trim the edges and cut the desired lengths and widths.

The Rialto press uses a maximum of 10 psi for platen pressure and 250 psi on the glue joints. The pump and control valves are of their own design and manufacture. Noteworthy is the pump that has self-contained means of delivering variable volume and pressure with complete unloading. The press was designed to complete two press loadings a minute. Tests show that it will be possible to load, press and cure panels consisting of pieces 1 in. thick, 3 in. wide and 7 ft long in 15 to 20 seconds.

Electrical and power sales engineers naturally will be most interested in the high-frequency oscillator, which has an input rating of 58.2 kva, 91% pf. Nominal output is 25 kw or 85,325 Btu per hour. The unit is a direct-coupled, shunt-fed, Colpitts-type oscillator in which the load is used as a part of the plate-to-cathode capacity of the tank circuit. Thus the load to be heated is not a separately tuned circuit that, as its capacity changes during the heating cycle, must be continuously tuned by the operator. Rather, the load to be heated actually is a part of the oscillator and helps to establish its frequency. A single shock-mounted, air-cooled, RCA 5,671, oscillator tube is used with plate dissipation of 25 kw.

The use of a single tube and proper circuit design reduces any chance for parasitic operation that is frequently encountered in multiple-tube oscillator circuits. Frequency range is 3 to 16 megacycles with operating frequency close to 8 megacycles. Filament current is 285 amp and voltage 11. A voltage-regulating transformer assures long tube life by maintaining voltage within plus or minus one-half of 1%. Complete controls, indicating lamps, safety interlocking switches, etc., are provided.

Operation of this equipment will be watched with interest by the lumber industry and if production is everything the tests indicate there will be considerable demand for the equipment. PEECO and Rialto Corps. have already established a reputation in the furniture field and are prepared to extend their know-how to the entire lumber industry.



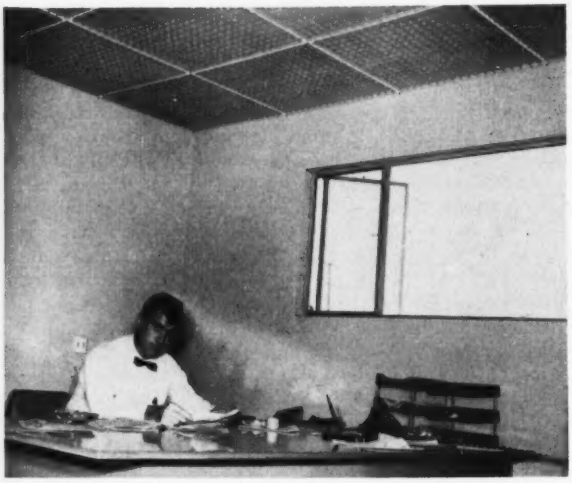
Additions and alterations crowded and confused circuits—the compact switchboard package replacing it provided added capacity

Modernize Distribution

Like thousands of buildings subleased to business tenants the Angelus Bldg., 741 Maple St., Los Angeles, had added and altered the distribution center so that conditions were unsightly as well as dangerous. Roller Industrial Electric Co. found poor taps and too many splices caused overheating of switches and carbonized conductors. Overfusing to prevent recurring fuse blowouts made it worse. Wiring was so confused that 3-phase power for the 12th floor was metered both on its own and the owner's meter, requiring a long rebate.

Because it was impossible to alter or add any more, Roller recommended replacement with a compact, better-organized, more pleasing appearing dead-front switchboard assembly. It would also save on shut-down time and cut-over labor as well as space. The owner agreed and Roller Electric installed the standard Federal board seen above, with fusible swing-out switches for 3-phase power section and Stab-lok circuit breakers for the single-phase lighting section. Installation and cut over was made over one weekend and the total cost was $1,290 less than the rebate made to the owners by the utility from the old mismetering. Constant interruptions caused by overheated switches were completely eliminated. Code and utility requirements were met and additional capacity provided. These and much improved appearance made customer satisfaction.

San Diego manager, Al C. Eddy, can see what goes on in the large shop back of his office through sliding glass windows in the wall

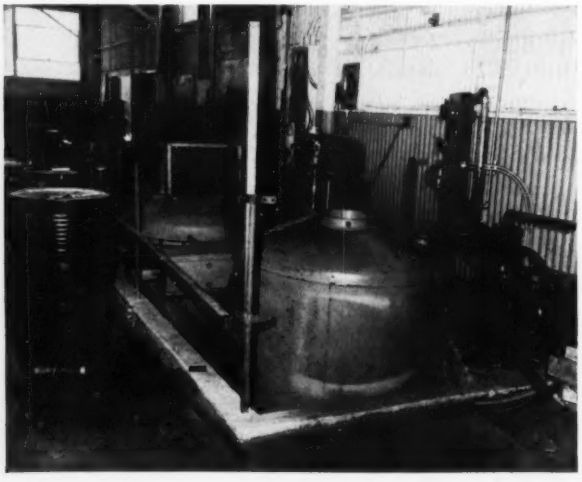


Fred Byron, assistant manager and chief estimator, works under a Benjamin louverall ceiling, which can demonstrate good lighting

What Space Does to Speed Service

Nothing speeds service like space to turn around in. After being cramped into too small quarters, that is the experience Ets-Hokin & Galvin, electrician, is having at its recently built new San Diego shop right on the bay near the foot of Sampson St. Adequate space to do its variety of work and store the variety of materials and equipment it handles, has definitely speeded its service and improved the efficiency of its personnel, Louis Ets-Hokin, president, finds. This versatile electrical organization that began as marine electricians in San Francsco, where headquarters remain at 551 Mission, knows from experience with seven shops that include everything from appliances, lamps and home wiring to industrial, commercial and marine work and electronics. These seven branches are San Francisco, Wilmington (headquarters for the southern California group, under Milton Chugg, manager), San Diego, Long Beach, Stockton, Oakland and Monterey. The San Diego branch, managed by Al C. Eddy, outgrew its crowded quarters. Doing considerable marine work both for the San Diego fishing fleet and the Navy, this crowded condition caused delays that were costly and harmful. In building a new place care was taken to get ample ground space and then lay out on it the most convenient arrangement of storage, shop, office

Sturdy workbenches are equipped with Wiremold channel to accommodate test circuits of 110 or 220 v, test lamps, adjustable lamps. Electronics benches are equipped with testing instruments



Vacuum impregnating tanks, as they were being installed, give rewound coil, motor stator or rotor, a deeper penetration of insulating varnish by removing all air that could cause pockets inside

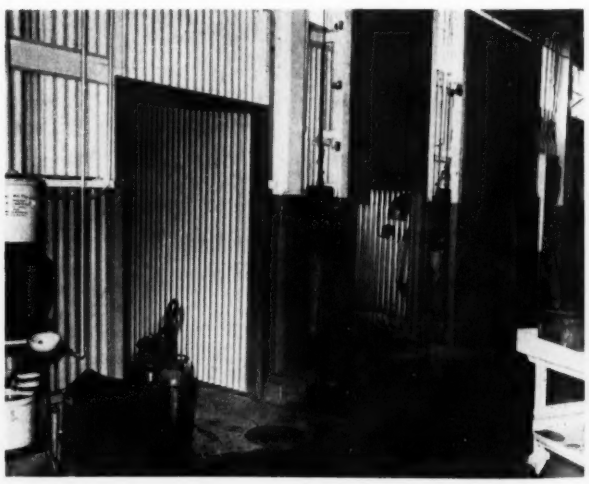
Susan Alsop, at rear, in charge of accounting, presides over an office well lighted with concentric-ring silver-bowl incandescents

The main estimating office is lighted to 100 f-c with Lipscomb design indirect slimline fluorescent fixtures across the desks

and parking facilities. While at it they practiced what they preach by installing the kind of lighting they advocate for each of their own offices and shops. Now they can show a customer just what they mean by an example in their own office. In the drafting room, for instance, a totally indirect slimline fluorescent job produces 100 f-c on drafting tables. Fred Byron, assistant manager, has a louverall ceiling, which by switching can deliver four degrees of intensity. The accounting office uses concentric ring indirects. Manager Eddy's office has incandescent Skylight units. Fluorescent troffers are used in other offices. Out in the shop area the new color-corrected mercury lamps are used in Glassteel diffusers together with some incandescent units. Adjustable local lighting is used at machines wherever it would be advocated for similar use by customers.

The building housing the office and shop is set back from the property line enough to provide ample customer parking. A large yard surrounds the building, having two wide trucking entrances. Around the periphery of the yard are storage sheds to cover heavy field equipment, a large conduit rack, cable reels, welding equipment, etc. The clement San Diego climate permits a minimum of cover, which also means ease of access from the yard. The yard, for instance, is used in measuring off lengths of cable for a job, precutting it and rereeling it to send to the job.

The shop itself is divided into two sections, half of it for storage of wiring materals and small equipment. Shop offices are in the partition down the middle. The service and repair shop occupies the other half. Here again much work can be done outside in covered sheds alongside—such as welding, steam cleaning, painting or spraying, some assembly work. A crane system covers the entire shop, fed with Feedrail covered trolleys. Power tools too speed the work and service—metal saws, large pipe threaders, benders; pavement cutters and ditch diggers. In short, every facility and tool is paying its way in performance.



Cleaning section has steam cleaning outside, then these sandblast and burning-off rooms just inside, and the oven next. The vacuum impregnating section is adjacent, making a compact unit for all

Advantage is taken of San Diego's weather to use large outdoor yard for storage under sheds and for preassembly of some equipment. Ample yard space aids in pickup and delivery of materials

ELECTRICAL WEST

Preview 1953

HOW will 1953 shape up for the Western electrical industry? Fully cognizant of the fact that business forecasting is a precarious occupation and that January's hopeful predictions can become just bad guesses next December, we offer these observations on the outlook for the coming year:

Industrial expansion and production in the Far West is the highest since the war and will continue to rise.

The lot of the farmer will continue good even though the margin between income and expenses is narrowing. Agriculture will continue to be one of the West's biggest businesses.

Employment will set new records and unemployment remain lower than even in the war years.

Personal incomes will remain high and Western leadership in average individual income will continue.

Consumer spending will continue at present high levels. However, as the year progresses more and more good salesmanship will be required to keep it there.

Construction should maintain its present record rate of expenditure. Utility spending for new facilities will increase. New government construction will offset any declines in other classes of building.

Business will function in a friendlier climate than at any time in two decades. This is especially true in the electric utility business.

All of those predictions are based upon a leavened mixture of analysis of current business conditions and trends and of sentiment and hunch. To offset these there is an increasing feeling that although the steam in the boiler may carry business upward for a full year, the signs of a setback are increasingly apparent. Question is, when? For the Far West, not in 1953.

So for the electrical industry of this region, we feel certain that 1953 will in truth be a happy and prosperous new year. Yet it is not a blank check. Rewards will come to those who earn them with enterprise, in the tradition of freedom.

Taxing to Destruction

OFFICE-SEEKING politicians have repeated the statement that "the power to tax is the power to destroy" so many times that it has no more meaning than the shepherd boy's cry of "wolf." So there is an element of shock when an actual case comes to attention. Consider the plight of one of our good advertisers, forced to curtail his operations because of this situation:

"One or two . . . manufacturers have been engaged in a price war . . . An analysis has resulted in the following conclusion for their drastic reduction in prices . . . In 1950 these firms priced their (equipment) excessively high and gradually reduced the price until it was on a more competitive basis in 1951. Their volume was such that the excess profits tax cut in deeply on their profits. Therefore, in 1952 beginning January, they cut their price until they were selling and are selling below cost. As a result they will show sufficient loss to recapture the 75% excess profits tax paid for the year 1951."

Competition based on such a tax loophole not only is unfair but if continued, can destroy business. It reminds us of a statement made by the sales vice-president of a great electrical manufacturing company: "The most dangerous element in business is a competitor in distress."

Handwriting on the Wall

COULD it be that Bonneville Power Administrator Paul M. Raver's proposal that the federal government get out of the power business in the Pacific Northwest anticipates something that is bound to happen anyway? The Raver plan, explained in detail in the news pages of this issue, sounds radical coming from him. However, he like Belshazzar may see the handwriting on the wall.

Conjecture by people close enough to the new administration to know policies and plans is that legislation will be introduced in the new Congress to turn the vast federal power empire over to local agencies of

EDITORIAL VIEWS

some form or another. Former defense mobilization chief, Charles E. Wilson, first proposed the step. Since then the subject has been discussed by Congressmen and others, usually in a favorable light.

BPAdministrator Raver could be calling the turn. Folks in the electric power field here in the Far West fervently hope so.

Wire Heat Dissipation

LAYMEN may wonder how electricians keep from getting entangled in wires of complicated circuiting but only a few have been aware of another tangle of wire that has bothered the electrical industry for far too long a time. This tangle is over the wire carrying capacity tables of the National Electrical Code. Ever since the new tables were introduced in the 1940 edition they have been the object of argument, particularly in the State of California which has a safety code that takes precedence over local ordinances in respect to wiring in places of employment.

Last month a major effort was made by the wire manufacturers to demonstrate that the basis for the National Code tables was a sound one, based on laboratory tests of the behavior of wires and cables under load. In two meetings (Los Angeles and San Francisco, see p 80) the tests were repeated and the data reviewed in detail. It was all convincing proof that the NECode was right—for fully and continuously loaded circuits.

What local engineers pointed out, however, was that such main feeders are seldom so completely loaded and then only for so short a time that no practical reason remains for using the 1940 and later code tables. And the state representatives said that without evidence of hazard from use of present tables there is no legal right to require the extra copper the code tables prescribe. The two lines of thought were still running along parallel lines, never to meet.

But what soon became evident to a thoughtful and objective observer was that the difference was more than in the tables—it lay in the application of good judgment rather than still-imperfect formulas. The NECode tables have a number of qualifying factors to consider—the Safety Orders do not. Until this middle ground is explored more by both the California Safety Division and the appropriate committees of the National Electrical Code, East will remain East and West West and ne'er the twain shall meet. For it is in this middle ground of fitting the wire size to the load, the demand, the surrounding temperature, and similar considerations, that reality and practicality lie. It is to be hoped these meetings will have accomplished such a fresh approach that may yet lead to uniformity.

THE engineer has been slow to appraise the changed state of the thought of the nation. Accumulations of capital beyond those formerly visualized are necessary for constructing the great works now required. Many of these accumulations are thought—often without reason—to be beyond the range of private capital. More and more it has become the habit to turn to the public purse—national, state and local. Unfortunately, much of the direction of public spending is done without due consideration of economic and engineering fundamentals. The engineer has, in too many instances, allowed the top command to fall to others who may have greater personal appeal . . . but who do not have the training, experience, or even the respect for sound engineering or economic analysis requisite for proper guidance. The engineer must assume the responsibility of furnishing and guiding public leadership to an extent which has never been done before. Many of the conditions confronting the engineering profession have resulted from failure to assume intelligent, forceful leadership. The tendency to shirk responsibility at all levels is too common
—Walter L. Huber, president, American Society of Civil Engineers.

Santa himself was the celebrity host who conducted the drawings

To be seen on TV was an attraction on the floor of the show

Familiar Events Draw Throngs to S. D. Show

"Mr. Santa Claus," played by a retired utility executive still a secret, proved a greater attraction to the 15th annual Electrical & Home Appliance Show of the Bureau of Home Appliances of San Diego County, which closed Dec. 3, than big-name celebrities in the past. Nearly 5,000 children sat on his lap. About 175,000 people attended the show and the four big halls in Balboa Park were crowded the entire time. Exhibitors said the show did more to develop both immediate and future business than any predecessor show. No outside or big-name talent was used. The show opened with a public appearance of Santa and starting of the lights on Christmas Tree Lane in front of the exposition buildings, at a ceremony highlighted by the choir of Hoover High School. In the show itself the demonstrations drew the crowds wherever they were conducted. Station KFMB-TV had a camera on the floor and the crowds saw themselves on television. A community antenna system had been installed to serve all exhibitors through a coaxial cable. Another attraction was the electronic hot dog cooker. The model train display had crowds constantly. Door prizes and free admission, plus a long tradition of annual shows, brought the usual huge crowds to view, shop, compare, and to buy appliances and television.

Those who put on a "pitch" or demonstration drew the passers-by

J. Clark Chamberlain, right, and some of the big show committee

Most Important Problems for Dealers in 1953

1

Problem: Advertising and selling integrity.

Answers: Members must work with each other and with distributors to maintain integrity of selling and advertising practices. Integrity in service is of great importance to the purchaser also and no dealer can afford to underestimate it. Care must be exercised that too loose a view is not taken when preparing or okaying advertising copy. The league can be a clearing house for advertising complaints. Cooperation with the Better Business Bureau is necessary. Experts in exaggeration will flood the field. If established local dealers do not restrain their own use of adjectives the public will not be able to distinguish between the sheep and the goats.

2

Problem: How to prevent damage to sales from the power shortage.

Answers: (1) Eliminate government interference with private enterprise so that it can develop more power and get out from the domination of government agencies that keep up a perpetual shortage. (2) Accurately evaluate the available power and see that it is equitably distributed. (3) Eliminate contradictory and confusing information to the public. (4) Stop overselling of power from projected plants even before that power becomes available. (5) Keep on selling the idea of the use and benefit of the appliance, whether power is short or not, for shortage is a temporary situation. If they do not buy, power shortage or not, they are not really sold.

3

Problem: Keeping up TV sales volume after the first rush is over.

Answers: Stations will need to maintain a high level of programs to sustain interest, although this is not something the dealer can depend upon too much. Competent service to owners to keep them satisfied boosters; follow-up after sales. Contests to develop TV program interest.

4

Problem: Where to get capital needed for TV merchandising.

Answers: Needed capital is especially a problem of small dealers who will probably need distributor help to institute cooperative flooring programs and to offer financing plans. Good relations with banks are needed for capital requirements.

5

Problem: Adequate television service and parts supply.

Answers: The league has taken steps to train personnel for service work and to establish standards that will keep this part of the business as clean and upright as possible. The public is aware that it can be gouged by unskilled or unethical service shops. Each dealer should survey his service situation. Parts supply is a *must* in order to give service.

6

Problem: How to maintain consistent white goods sales in an active TV market.

Answers: More cooperative planning by the league, dealers tying in with advertising. More contact with customers. More live demonstrations. Keep up interesting displays of white goods. Use TV for advertising white goods instead of working against it. Do not move white goods to back of store but give it its fair share of the display area. Institute special sales training for salesmen for both TV and appliances.

7

Problem: Price cutting and backdoor selling.

Answers: If dealers maintain a firm stand they need not be bluffed by customers who are only angling for a price. Dealers can consistently advertise and sell service and guaranty. A sound policy on the part of distributors is needed. If a dealer does not want that kind of competition himself, let him do nothing to encourage that kind of trading. Many times this evil comes from a high-powered factory program to unload a model before a new model comes out. Dealers liquidate their inventory and upset the market. The answer to this is to buy more carefully and not get loaded with inventory.

Spokane Dealers Find Own Answers

What are the seven most pressing problems that will face electrical dealers in 1953? How shall these best be solved?

The Inland Empire Electrical League, Spokane, Wash., for its first annual all-industry conference workshop, Nov. 19, used a new idea in meeting technique to arrive at these problems and answers. Their conclusions are briefed in the accompanying box. Only one, the power shortage problem, is unique to the area. All the others are problems that face dealers in the West wherever television is to be introduced in 1953 or where it has already come.

Dave Cohn, Prudential Distributors, league chairman, asked those in the audience chiefly interested in television to sit at certain tables and those in appliances at others. He then assigned to each table the task of determining what it considered the major problem for 1953. Fifteen minutes were then given to the tables for discussion among themselves to arrive at the decision. Each table then reported its findings. The problems were listed on a blackboard. Duplicates were coordinated and seven problems resulted. These were then individually assigned to tables for further study for 15 minutes. A table chairman then reported on the table's opinion of the best method to solve the particular problem.

Other events of the annual dinner included announcement of new directors elected for 1953. These were as follows: from sustaining members, Maage LaCounte, Columbia Electric Distrbuting Co.; Ralph Ford, Taylor Distributors; V. E. McCain, Graybar Electric; from the utility, Lou Thrailkill and Frank Toole, Washington Water Power Co.; retailers, Lloyd Distaff, Lloyd Sales & Service, and Byron Klane, Electro Mart; contractor, H. A. Smith, Electric Smith; miscellaneous, R. J. Murphy, Ra-tels.

New chairmen of the three sections of the organization and their vice-chairmen were also announced: the appliance section, Glen Waugh of Sears Roebuck & Co., chairman, Ernie Hatch, Washington Water Power Co., vice-chairman; supply section, Henry Vincent, Westinghouse, Dave Mozes, G-E Supply; radio-television section,

V. E. McCain, Carl Hoffman, Dave Cohn, IEEL president, standing, Bob Wilkinson, manager, Frank Tool, Maage LaCounte, around head table when problems were reported

Bud Brown, Densow & Brown, and Rolly Spiger, Sunset Electric. The directors later will meet and select a president. Robert Wilkinson is manager.

William Harder, OPS representative, reported on meetings with dealers and distributors to agree on maximum ceiling prices for labor charges and mileage for service on television, saying that all would have to file under CPR 34—Services.

Reports of the past year's activities of each of the sections were then heard. Frank Toole reported for the appliance section in the absence of Russ Williams. The electric food preparation and housewares campaign in June brought up range sales over last year; a July and August refrigerator and freezer campaign improved conditions over the past year and resulted in a 35% increase in freezer sales over 1951. Similar results had been obtained in the laundry promotion in September and October where ironers were given away and results showed a marked increase in ironer sales per washer and a great increase in dryers.

LaCounte reported for Albers of the radio-television section, telling of meetings with broadcasters and Better Business Bureau to set up standards of advertising and of service. A three-day service school to familiarize the dealer organizations with anticipated problems of television was held. A public education and information program had been held over KHK on Saturday evening by league members, Better Business Bureau, etc. A safety committee had been formed with Jim Paxton, city inspector, regarding television antenna installation. Agreement on principles had been reached without any need being felt for licensing. Other activities included a dealer registration program with the BBB, an advertising program to establish confidence in league members, and a trade school technical program for the training of TV service men.

The apparatus and supply section reported on three campaigns conducted during the year, the first on commercial cooking which had resulted in sales of $40,000 in wiring and equipment; an air conditioning program, which had sold 1,116 hp as against 1951's 513 hp; and a store lighting program, which had exceeded the quota of 415 kw by 600 kw.

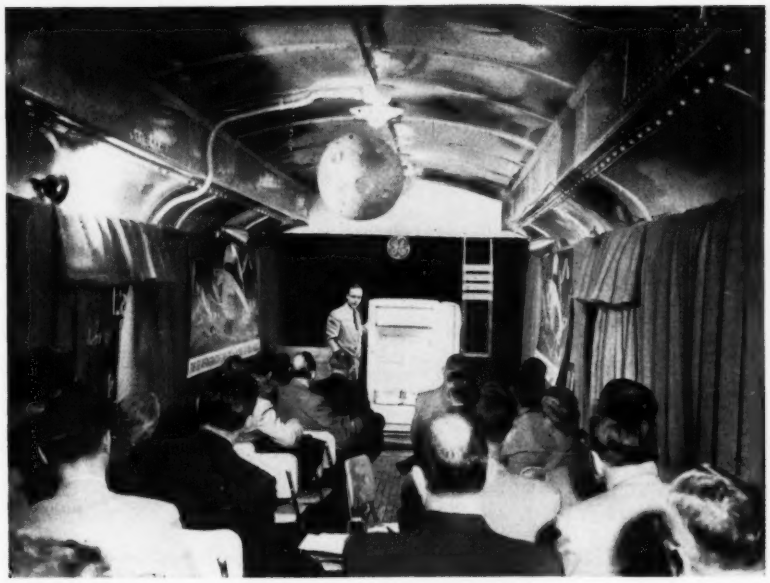
To Teach Lighting

Grace Schoeni has been appointed home economist and home lighting specialist for the Portland General Electric Co. in the outside divisions and will work under Chet Jarrett in presenting lectures in schools. The first type of lecture will be the usual home economics story on the use of electric ranges and utensils. Meanwhile a talk on home lighting is in preparation and will be regularly scheduled to the schools who want it throughout the division. Demonstration equipment will be provided and tape measures and recipe booklets will be presented to the students to take home and measure their own lighting.

The idea of the home lighting program developed as a result of some meetings with school board members, at which their wives attended. The school lighting story was told by representatives of PGE and the wives asked what they could do about their home lighting as well. This developed into a need to give instruction on proper illumination in the home.

Miss Schoeni is an Oregon State College graduate in home economics and has also been an art instructor.

As many of the officers of the Inland Empire Electrical League as could be detained after the meeting are pictured together here



Kenneth Roe shows distributors the 1953 refrigerators from a baggage car when . . .

G-E Appliances Try the Trains

General Electric put its 1953 appliance show on the road in November, with railroad baggage cars fitted out as "exhibit halls on wheels" to introduce the company's new line to key distributor personnel. The Western train traveled some 4,000 miles, making stops in Salt Lake City, Portland, San Francisco and Los Angeles.

Each train consisted of three baggage cars, along with a Pullman car to accommodate company personnel who showed the appliances and outlined 1953 marketing plans. The cars were carried as sections of regular passenger trains. A revolving platform in each baggage car facilitated demonstration of the appliances.

At the San Francisco Bay Area showing at G-E Supply Co., Emeryville, Nov. 20, H. A. Warren, manager of distribution at the firm's plant at Louisville, Ky., predicted the industry's 1953 appliance volume would increase 16% over 1952. He said inventories are only half as large as last year.

Of the total volume of major appliances sold by the industry today, refrigerators constitute 34% although they represented 51% in 1941. Refrigerator sales have maintained a 4,000,000 annual average, but at the same time, a rapid growth of other products—such as freezers and room air conditioners—has swelled the total.

Some of the key G-E personnel from the major appliance division accompanying the Western train were Richard Elan, advertising department, Louisville; Marjorie Harper, home economist, Pacific district; H. A. Oliphant, manager of marketing, range and water heater department; John St. Lawrence, district representative, household refrigerator department; and H. Gordon Smith, Pacific district manager.

Included in G-E's new line of appliances are: three completely restyled combination refrigerator-freezers; two fully automatic refrigerators with directed cold air circulators throughout the frozen food section; four manual defrost refrigerators; two room air conditioners that will adjust themselves automatically to room temperature changes; and a new dishwasher that will clean dishes hygienically and warm them for serving of hot food.

Use of the baggage cars for distributor meetings was so successful that the idea may be used for small dealer meetings in a larger number of cities in the future, it was said after this experiment. General Electric has used trains for industrial traveling exhibits on previous occasions.

House Heating Forum

Electric house heating in the Vancouver, B. C., area was the subject of discussion at the third annual forum of the Electric Heating Assn. of British Columbia held at Vancouver, Dec. 3. Electrical dealers, contractors, utility people, representatives of equipment manufacturers, life insurance companies, home builders and real estate agencies made up the 108 who attended.

These views were brought forth in panel discussion: Utility men — rate schedules should include demand charges that are not prohibitive but which instead will promote a good factor; home builder—electric heat is offered as a primary selling point; architect—building design must be the most economical from the heating standpoint; mortgage company — before money is loaned for homes, we want to be sure that electric heating will not become a white elephant; real estate agent—electric heat has proved out very well in the smaller homes.

C. A. Manson, sales manager, B. C. Electric Co., said electric heating is an excellent form of heating and should not be hindered by prohibitive demand charges. His company has a one-cent tail-end block in its residential rate designed to take care of electric space heating.

Phoenix's 1953 Staff

If contesting for place is any indication of interest, the election of officers for Appliance Merchandisers Assn. in Phoenix certainly had that evidence. Although the main officers were unopposed, the directors contest was a real contest. There were 14 candidates for six Phoenix dealer representatives on the board and four dealers ended up in a tie for the three one-year terms. This caused an increase in representation from the Phoenix area to seven to allow all four candidates to serve. Two other candidates ended in a tie, just one vote off the winning place.

Elected were: for president, Jim Donohue, Climate Control Co.; vice-president, Glen Jones, Arizona Hardware Co.; secretary, Don Morgan, Al Jennings Co.; treasurer, Leon Black, Black & Ryan; and directors for two-year term, Russ Morrissey, Mehagian's; Tommy Thompson, Thompson & Johnson; Chick Meyers, House of Television; Paul Fannin, Fannin's, and E. A. Thomas, Arizona Wholesale

Supply Co. Directors with one-year terms: Bob Culver, Culver's; Bud Cummins, Sunny Furniture; Dick Dollarhide, Sears; Marriel Hamilton, New State Electric; Jack Canady, Palmer Mfg. Co.; Bill Constance, Westinghouse Electric Supply; Dick Bernard, Glendale Appliance Mart; Chet Smith, Smith Appliance, Tempe; Jack Kiedaisch, Arizona Public Service, and Jim O'Neil, Home Supply Co.

The association ended the year with a full-scale promotion on all appliances, especially housewares for Christmas gifts. A program for the promotional events of next year is in preparation and is soon to be announced.

Bakersfield dealers took to tents—as did the city and county offices—when the earthquake rendered their buildings no longer safe. This is McMahons store in Bakersfield, under a circus tent, and this is the appliance and housewares department corner. Fortunately an empty block was found a couple of blocks from the store now demolished and which will be rebuilt with bigger and better facilities—as well as earthquake proofing

Women Select Lamps

Where style plays so important a part and preference by women is hard to gage, the method used in Idaho Power Co.'s certified floor and table lamp selling program to select models for sale is worth imitation. Home lighting programs have long been neglected. However, at Idaho Power lamp selling programs have been carried on during the past two or three years. The purpose is to create consumer demand for certified floor and table lamps, as well as to build additional revenue. It is felt a great majority can well afford good home lighting but are uninformed as to what is available and what it costs to enjoy it.

On the heels of a successful lamp bulb selling campaign in which dealers and company employees participated, the certified lamp drive started Nov. 3 and ran to Jan. 2. It was built around the lighting recipe booklet and all employees had been enlisted to participate. A free-trial period, not to exceed 10 days, was offered. It has been found that 75% of home demonstrations resulted in sales. A system quota for the two-month period is 528 floor and table lamps.

To select the lamp models to be sold, four meetings were held in four divisions of the company to which the wives of the sales staff and the management were asked to come. Talks on the program were given by Earl Olsen, sales manager, and Al Gilbert, promotion manager, to outline the purpose and plan of the drive. About 28 samples of certified lamps were then exhibited and the wives of the sales staff were asked to select those which they preferred. This provided a selection that was felt to be a cross-section of general customer preference and taste. The selection included some contemporary as well as more conventional styles to fit various types of interiors.

At press time results had not been tabulated but sales were running over the quota. This was attributed to direct home demonstrations and sales presentation. The dealers in town also were inclined to stock and feature certified lamps under this impetus.

Industrial Conference

Modern electrical methods for industry was the subject for an industrial forum headed by General Electric Co. under the sponsorship of Utah Power & Light Co. at Hotel Utah on Nov. 14 to some 200 representatives of industry in the Salt Lake City area. General chairman was W. A. Huckins, manager, business development department, of UP&L and panel chairman was F. W. McChesney, industrial department, G-E, Salt Lake City. McChesney gathered with him other experts from the industrial divisions of G-E. He, himself, described industrial productivity as the decisive weapon to keep the United States strong. Huckins presented a brief view of the place of motors in industry and the value of progressive mechanization.

F. F. Stevens, industrial sales, G-E, described power distribution as the nerve system of the industrial plant and showed several modern practices in that field. F. M. Orsborn, Rocky Mountain district sales manager, G-E, described a number of instances in which adjustable-speed drives advanced production. H. R. Lloyd, Salt Lake City engineer, G-E, illustrated a number of practical applications of controls, especially electronic ones.

After luncheon, W. Davidson, superintendent Western service shops, G-E, differentiated between preventive maintenance and productive maintenance, which keeps equipment operating longer and more regularly. L. H. Albee, advertising and sales promotion district manager, reviewed methods to speed the knowledge of electrical know-how in industry through the use of visual programs and textbooks for reference. J. F. Fuller, application engineer, projected into the future of research and what it could bring forth for industry.

Freedom and Power, a full-color motion picture, was then presented by D. H. McAllister, manager, Salt Lake City office, apparatus department. The picture shows how free enterprise and industrial progress go hand in hand. L. M. Stauffer, manager, Rocky Mountain district, G-E, had introduced McChesney and the welcoming address was given by Dr. Adam S. Bennion, vice-president, UP&L. The final closing remarks were made by G. M. Gadsby, president, UP&L. In an inspirational talk he said the industry stands on the threshold of an unbelievable new age of electric-atomic power.

ELECTRICAL WEST Sales Guide

News Letter

FOR THE ELECTRICAL MERCHANT OF THE WEST

January 1953 ©

Crystal-ball time again with all kinds of predictions in the air. Not to get into the act but to sum up and recall trends to be watched in 1953, some of the most challenging ones are below: — Seers

Plenty of product unless there's a full scale war. All makes geared for bigger capacity; materials reasonably ample; labor not so itchy to strike. Danger is overproduction if not based on reasonable estimates of what the market can absorb or greed for too large a share. — Product

More manufacturers with complete lines--like RCA, Bendix, Crosley, Kelvinator. Consequences: more competition among the giants, tough on the one- or two-line independents; more distributor shuffling as competition for them uses up the supply and full line makes demand single line representation; where enough distributors are lacking or not thought strong enough, more factory branch or owned distributorships; more competition for the strong dealers and some desperation franchising of pretty-far-afield kinds of dealers. — Makes

Plenty of national advertising, using everything--magazines, newspapers, TV, radio, billboards, (Muntz even uses skywriting). More gimmicks and deals, premiums and contests, promotions and display helps. — Ads

It's trips to Paris this year instead of Mexico or Hawaii for salesmen bait. Norge told dealers it was giving them more margin instead, but others will offer sales contests with trips or cars for incentives. — Bait

Discount house and catalog house selling becoming a bigger problem as more sharpsters get into it and product becomes abundant and manufacturers--distributors and dealers too--unload inventory by transshipping or dumping to discount houses. Housewares have almost been lost now to electrical dealers. When Fair Trade collapsed they almost gave up competing, quit buying and displaying traffic appliances. With Fair Trade restored they are trying again. — Discount selling

But the supermarkets and cut-price volume operators are fighting Fair Trade hard. There are several suits against Schwegman, who broke it before. Meanwhile two different associations for Fair Trade are fighting between themselves and one baiting the Federal Trade Commission, which doesn't like it anyway. Looks like a year of court battles over Fair Trade with the McGuire Bill up before the Supreme Court. — Fair Trade

Suburban shopping centers are on the increase because of traffic and — Decentralize

parking expense and difficulties in downtown centers. Supermarkets are taking on appliances. Westinghouse even said to be cataloging grocery stores as potential outlets. But then, everybody is trying everybody else's business these days, making all general stores.

Decentralize continued

Television will capture the consumers' dollars wherever it is newly introduced and white goods suffer for awhile. Trade-ins will be a bigger factor in 1953 than preceding years, even in TV sales. Freezer plans are beginning to fall as grocers and markets meet the competition and saturation approaches. One big one may fold and the bank have to finish the contract for food. The fast operators have moved East to skim the cream from that market.

TV and freezers

On the whole the appliance business should be as good or a bit better than last year but highly competitive. Dealer inventory is low as caution has replaced optimism. Prices are under double pressure of material and labor increases and are apt to rise some. Chance of increased discount for dealers seems slight because public reaction to prices is to shop for discounts and deals.

Prices, discounts

Reports from the Chicago market tell of good attendance, lots of looking and comparing, reasonable buying but continued caution. Some of the newest lines were shown for the first time. A few totally new developments were shown for reaction--General Electric's pass-through refrigerator for wall mounting over a service counter between kitchen and dining area. . A sound wave portable washer from Australian patents now to be marketed by Mitchell Mfg. Co. . International Harvester's application of fabrics and color to exteriors of refrigerators, room coolers, etc. . Ironrite's new portable ironer. . RCA-Estate's new line of 4 electric, 6 gas ranges. . Westinghouse's new tank-type vacuum cleaner. . Just to name some of the new.

Chicago busy

Westinghouse is really going to give the gas people something to try to match now. Its new top line electric range has an electronically controlled surface unit that prevents food from burning, either at warm, boil or fry settings, even if the moisture boils away. The entire new line, with refrigerator-freezer, automatic defrosting on both, upright freezers with a Freez-File, new touch opening doors, a portable automatic dishwasher, new table top water heaters and a short food waste disposer will be shown to dealers at big musical show presentations in Denver Jan. 18, Salt Lake Jan. 21, Los Angeles Jan. 25, San Francisco Jan. 27, Seattle Jan. 30, Portland Feb. 3 and Spokane Feb. 5. Walter Baker had the distributors from the West in to San Francisco Jan. 8-9 to take the wraps off the new features. The TV line was shown them Jan. 10.

Try and match this!

Bendix distributors like L. J. Meyberg Co. unveiled the new line of ranges, refrigerators, freezers and the Duomatic washer-dryer in one compact 36-in. cabinet to their dealers early this month. The new Duomatic washes and dries an 8-lb load in 75 minutes or can wash or dry separately. Bendix still has its full laundry line.

Two in one

Frigidaire, with two improved 30-in. ranges and four new models of refrigerator, one with freezer, will also feature a new 120-v, 20-amp Filtra-Matic dryer which, because it requires neither extra wiring nor plumbing nor vents, should sell in volume.

Dryer dryer

Kelvinator is trying a new distribution policy for its Leonard line, having appointed MacCormack & Co. in San Francisco as first of new distributors; makes it full competitor as Hotpoint is to G-E.

New policy

Among manufacturers the news is: Sanitary Refrigerator Co. changed its name to its brand, Quickfrez, Inc., and established a Los Angeles office under L. C. Ostermann Jr. . Hamilton Mfg. Co., maker of dryers, will now bring out its own automatic washer. . Laundry Queen is to have an automatic, which is only just as it is made by Automatic Washer Co. that has the name but not the automatic. . Easy, too, may finally spring an automatic but not just yet. . Acme-National Refrigeration Co. of Long Island also has a compact Spacemaster Kitchenette with 4-cu-ft refrigerator, range and sink top in 30-in. cabinet. . Thor will soon be making Gladirons again. It stopped when material restrictions were imposed. . Odin Stove Mfg. Co. will introduce a dryer regulated according to dryness instead of time. . Iceberg Freezer Corp. has coming a three-drawer type of upright freezer, each with its own front instead of a door. . Jordan Refrigerator Co. of Philadelphia is introducing a line of upright freezers in the East.

Makers make news

A 30-ft home freezer, holding 950 lb of food, delivered knocked-down so that it can be taken in through doors and assembled inside is the newest idea of John Bass who owns "Freshmaster Corp." It is also a pretty substantial rumor that negotiations are under way for a merger with the Rich Plan. Several others are also involved.

Door no barrier

Dates for important dealer group meetings: Jan. 12, Appliance Merchandisers Assn. of Phoenix holds its annual sales meeting at the Westward Ho Hotel to launch its 1953 sales program. Carl Sorby of Roper Stoves and Peter Lowcher, vp of Deepfreeze, will be key speakers. . Jan. 21, Intermountain Electrical Assn. holds its annual conference and installation of officers at Hotel Ben Lomond, Ogden. . Jan. 22, the Electric League of Los Angeles holds its annual installation dinner at Rodger Young Auditorium, Los Angeles, and Jack Lacy, famous sales training lecturer, will be featured.

Calendar

In February there is Market Week at the San Francisco Merchandise Mart, Feb. 2-6, culminating in the Appliance and Radio-TV Trade dinner, Wed., Feb. 4, at which Robert Gros, PGandE publicity director and lecturer, will tell of Far East observations and there will be speakers on appliances and television.

Market week

A series of Jack Lacy Clinics will start in Northern California Electrical Bureau districts in early February. The clinics will run for a full course of classes on salesmanship and enrollees will receive certificates and manuals. A charge is being made for the course.

Training

San Diego's Bureau of Home Appliances has its winter conference packed into a half day, Wed. Feb. 18, at the House of Hospitality in Balboa Park. Speakers have not yet been confirmed but the usual strong program is predicted. . Also in preparation is the annual Spring Fair of Modern Home Ideas in Balboa Park, April 21-26. As with last year's similar affair that drew 125,000 people, one building will be devoted to home wiring and construction materials and ideas.

February and April

A Spring Appliance Show is also being geared for action by the Appliance Merchandisers Assn. of Phoenix, at the state fair grounds, April 9-12. Television will not be included as a separate show for it is planned in the fall.

Phoenix too

What will a Mexican television station at Tijuana do to reception in the San Diego area is to be the subject of a special meeting in San Diego by its Bureau of Home Appliances on Jan. 29. The bureau's committees have been in contact with XETV-Channel 6 over the matter.

Interference?

Dynamic business moves on

Distributorship shifts noted lately: General Electric Supply Co. has made a new district office of its Sacramento branch. Edwin M. Ames is district manager, Len S. Oppenheim is its sales manager of appliances and electronics. . Kaye-Halbert appointed Electronics Associates Inc. as its Hawaiian distributor. . Berebeth Corp. has been made the Admiral distributor for Hawaii. James Hong is its president. Hawaii comes under Lou Willis, Admiral regional manager, Los Angeles. . . Frank Edwards Co. is now the DuMont TV distributor for northern California, succeeding Thompson-Diggs, and resigning the Stromberg-Carlson distributorship. . The H. E. McMasters Co. of El Paso has been named Raytheon distributor in that area. . F. B. Connelly Co., already Sylvania TV distributor in Seattle and Portland, now also does so for Spokane and Harold D. Brant is its Spokane manager. . Coolerator has appointed the Thomas Distributing Co. of San Diego as its distributor. . A new distributorship, Black & Ryan, is soon to open in Tucson to handle the Hoffman line. . Robert J. Shea, a partner, has taken over full ownership of the San Diego Imperial Supply Co. in San Diego. . Grauman Co. of Denver becomes the distributor of Pacific-Mercury TV in that area and Service Games Inc. in Honolulu. . Dick Hyde Co., factory rep for Sheldon, Webster, Steelman and Walsco in Denver, moved from 3879 Tennyson to 3250 S. Dexter.

So do its people

Among people the word is: A new Western region has been set up by General Electric Co.'s major appliance division, Louisville, and Harry P. Gough, vice-president of G-E Credit Corp., New York, returns to the West where he managed the Salt Lake and later Los Angeles office, to be its top man. H. Gordon Smith becomes S. F. district manger, Robert Skeen Seattle's, Charles Rowland Los Angeles', and Fred Hagar Salt Lake City's. . Admiral expansion has resulted in William B. Doyle, former San Diego distributing division sales manager, being made national sales manager of the range division and Claude E. Davis, from Golden State Distributing Co. in San Francisco, to be Northwest regional manager officed in Seattle, and Darrell Peron has become sales manager of the appliance division of Golden State in Los Angeles. . At Sues, Young & Brown, Los Angeles, Charlie Culbert announces appointment of former Proctor home economist Dorothy Huse as home service director of S.Y&B; and Harold Brasure as field sales manager for Zenith division; Cy Hughes for Norge division; and Peter Frank has returned as ad and sales promotion manager. . American Kitchens' Fred Hastings has promoted Michael H. Stevens to be Seattle district sales manager, replacing W. L. Shearer. . George Hyde has just been appointed Denver representative for Dulane Inc.

TV most of all

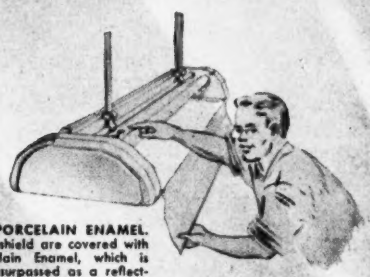
Television mania hit Colorado Springs as KKTV got on the air before Christmas. Fortunately everyone was well stocked. Signals were received well in Pueblo and south Denver. . KSL of Salt Lake City's brand new 9,000-ft elevation tower was blown down in a storm a few days after it went on the air so the old antenna is serving until spring allows crews to rebuild it. Meanwhile KDYL's tower withstood the blasts on an adjacent mountain. . Palm Springs, hidden behind Mt. San Jacinto from L. A. stations, got TV by coaxial cable just before Christmas. . Honolulu also went slightly mad when two stations, KGMB and KONA, started up and to protect the public Television & Radio Industry Assn. and BBB set up a seal of approval system and emblem. . Canada, clamoring for private enterprise to be given a chance with TV, is seeking licenses. Victoria has two bids for licenses. . Tucson's KOPO expects to get its station on the air by Feb. 1. . California Governor Warren's conference to seek ways to start educational TV stations explored the subject but came up with no answers to the problem of money. Many oppose state TV as a propaganda medium.

now, a new high in seeing comfort

through sensationally-increased UPWARD LIGHT...

Now, approximately ¼ of light is directed UPWARD through a completely new, precedent-shattering concept of lighting unit design! The new Benjamin "Task-Master" is the modern solution to the brightness ratio problem. By combining greater upward flow of light with a new high of 35° in lamp shielding, "Task-Master" doubles, even triples, present standards for industrial seeing comfort. In addition to sensationally-increased UPWARD light and lamp shielding, "Task-Master" features revolutionary new, easier methods of installation and maintenance, such as those illustrated below. Send for FREE "Task-Master" Bulletin, giving further details. Write for Bulletin AD 5906. Benjamin Electric Mfg. Co., Dept. J, Des Plaines, Illinois.

BENJAMIN "Task Master"
Sold Exclusively through Electrical Distributors



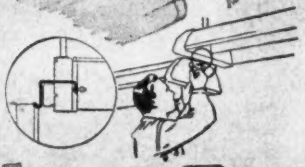
DETACHABLE REFLECTORS are hinged to make possible easier, more thorough cleaning right on the fixture. They may also be detached and cleaned away from the unit. Available with sliding hangers, as shown.

"LIFE-TIME" PORCELAIN ENAMEL. Reflectors and shield are covered with genuine Porcelain Enamel, which is unsurpassed as a reflecting surface because it cannot wear, scratch or become dull.

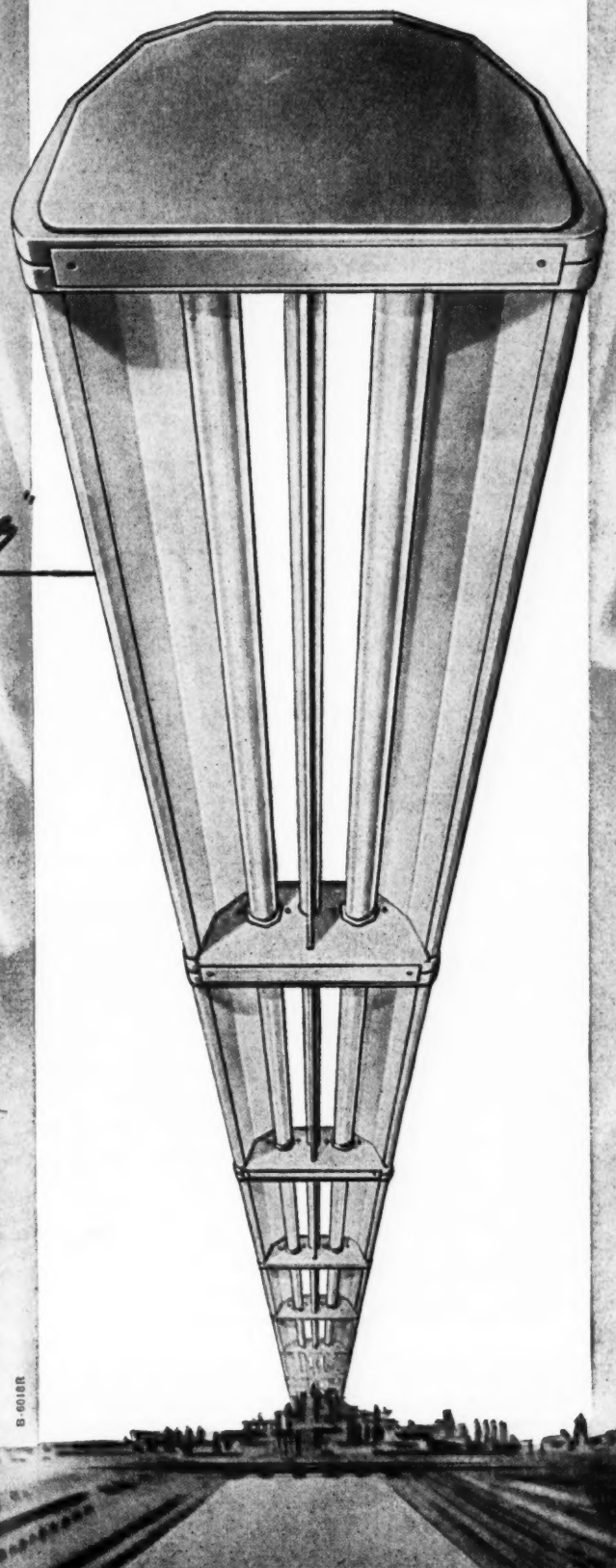
"SPRINGLOX" LAMPHOLDERS are standard equipment. These rugged, all-metal, lifetime lampholders facilitate lamping and relamping through patented spring design.

LONGITUDINAL SHIELD. Unique combination spine-support and lamp shield provides shielding angle of 35°. Result: great reduction of direct glare with consequent increase in seeing comfort.

PRE-WIRED—NO WIRE SPLICING. Delivered with all connections made up to terminal block. Branch-circuit wire comes already run through spine support, entire length of unit.



SPECIAL "HOOK-UP" DESIGN makes it possible for the installer to temporarily hang one unit on another while connecting the jumper wires to opposite terminal blocks.



B-6018R

Quick Pickup

Electric Clubs

Both East Bay Electric Club at Oakland and **Electric Club of Los Angeles** (as well as Security Analysts of San Francisco) heard Dr. Millard C. Faught, consulting economist for Zenith Radio Corp., give a penetrating economic analysis of the future of television and the prediction that it will need to be tied to a box office or cash register if it is to reach its potential. That would indicate that something like Zenith's proposed Phonevision will have to be used to finance the high grade educational, sports, operatic, musical and entertainment programs that the public wants.

He showed how television already has pushed Hollywood's revenues down 27% since 1947, hurt Broadway and spectator sports, which already had been slowly choking to death on the unsolved traffic problems of the era. Television can also reach an added market of 20,000,000 people that Hollywood can't get to, people who are housebound for any of a great number of reasons.

That the high cost of television production and transmission cannot be supported by advertising alone, but that television must be run through the box office on the way in some manner, was the point he made. The $80 billion worth of goods that will have to be sold each year to support the $1½ billion television costs cannot be depended entirely on the maximum of 70 hours per week time on the air available for advertising, even if nothing but commercials are used. Dr. Faught predicted that FCC would set standards for subscription television, which in turn could help support a thousand television stations and the entertainment and sports industries.

Los Angeles Electric Club's scholarship committee consisting of Arthur Howard, chairman, Joseph H. Pengilly and A. W. Jensen met with Dean L. W. Jones and Dr. Ernest H. Swift of California Institute of Technology to interview candidates for school scholarship awards. Edward H. Daw, a Navy veteran from Seattle, was the selection by the committee and was introduced at the Dec. 15 meeting.

San Diego Electric Club awarded prizes to high school students who were winners in the fifth annual public school motor winding contest sponsored by the club and schools of San Diego at an award luncheon Dec. 17. T. Malcolm Brown and Charles W. Patrick of the school department were present and prizes were awarded by Emery D. Sherwin, president, San Diego Gas & Electric Co. Prizes were contributed by manufacturers and distributors, and each sponsored certain students. Ernie Kipp, San Diego Gas & Electric Co., was chairman of the day.

John Nelson, newly-named president of the **Electric Club of Washington,** succeeding H. R. Loew of the General Electric Co. has named the following committee chairmen to serve during the 1952-1953 Club season: Membership: Herb L. Mote of Graybar Electric; legislative: James Fletcher, General Cable Corp.; golf: R. A. Lemman, Line Material Co.; entertainment: D. W. Rennewanz, Hotpoint; budget, R. A. Church, Puget Sound Power & Light Co.; program: Luther C. McIver, Puget Sound P&L; attendance and special events: Clifford Tyler, City Light; sick: Chris Hawkes, Electric Storage Battery Co.; adequate wiring: Ernie Walton, Square D Co.; safety: Captain S. E. Sanislo, Seattle Fire Department.

San Francisco Electric Club held contractors' day Nov. 24, presided over by W. J. Varley, manager, San Francisco Electrical Contractors Assn. James E. Lash, director, San Francisco Development Agency, spoke on "The Redevelopment Plan for the Western Addition." Everett S. Lee, editor, General Electric *Review*, and past president of AIEE, gave a spirited talk on "The Electrical Engineer in the New World" at the Dec. 8 meeting.

Electric Club of Oregon held an election of officers at its Dec. 4 meeting and viewed its past presidents in a bill sponsored by Willard Wilson, Northwest manager, McCann Erickson Inc., and Dan Webster, Pacific Power & Light Co.

NRECA

The National Rural Electrical Cooperative Assn. holds its annual convention in San Francisco Jan. 26-29.

Los Angeles Electric Club's old-timers honored at a recent meeting included: front row—A. L. Stone, 59 years in the industry, A. G. Loveberg, 56, Frank J. Airey, 64, George A. Frazier, 53, Trudy Winter, Walter L. Harraden, 52, C. G. Pyle, 55, Clayton Biggs, 55, Walter Dorrance, 63; middle row—Charles Yarbrough, 56, W. R. Battey, 51, E. R. Northmore, 60, Charles E. Davies, 58, Joseph C. Miller, 53, H. L. Sampson, 52, R. E. Cunningham, 50, J. A. Duncan, 54, S. H. Anderson, 65, Homer Duffy, 50; back row—Dave C. Pence, 50, Millard Gemeny, 52, F. J. Darnell, 51, A. G. Nabors, 51, Harry L. Caldwell, 54, David Hall, 56, A. L. Pond, 64, W. Homer Kennedy, 64, and Charles A. Millbank, 54. Trudy Winter, center, new-timer, is the club's executive secretary

February-April Light Conditioning promotion helps you

Complete campaign boosts better lighting for kitchens, offers tie-in opportunity for you

GENERAL ELECTRIC starts off its light conditioning program for 1953 with a full-scale promotion on kitchen lighting. Scheduled for February through April, the promotion provides a solid platform on which you can build effective local merchandising. It's designed to help you coordinate your efforts with those of electrical distributors, contractors and dealers.

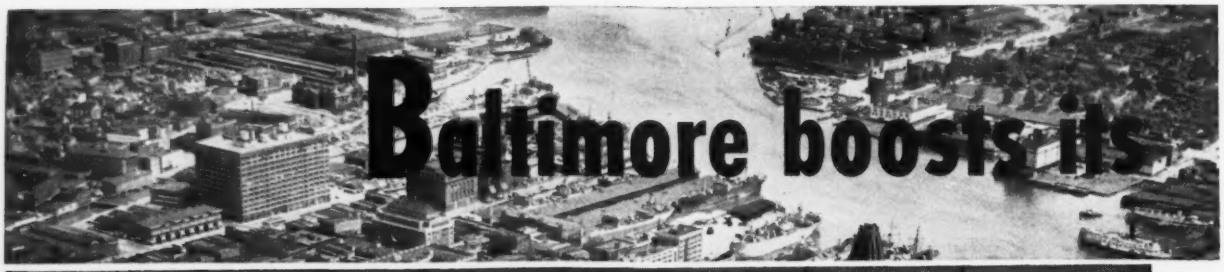
The G-E kitchen lighting promotion is backed by full-page, full-color magazine ads, newspaper publicity, counter cards and window displays, and dealer cooperation.

It's your chance to tap important new business. Study after study shows most homes have woefully inadequate kitchen lighting. That means millions of home owners . . . plenty of them in your area . . . are ready-made prospects for new fixtures, and lamp bulbs. By leading the way to the kind of lighting that makes kitchen work easier, less tiring, you'll build goodwill with customers and the trade alike.

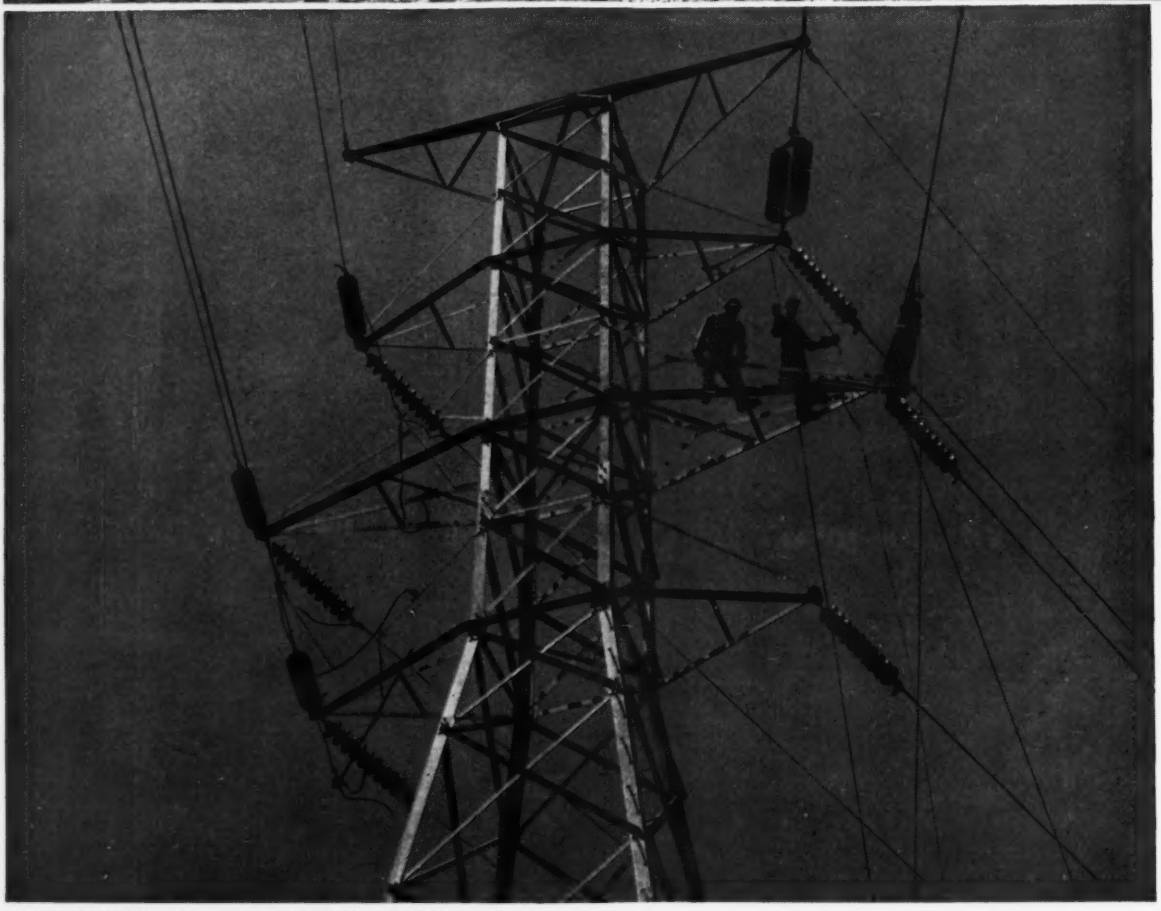
Right now is the time to make tie-in plans. Why not begin by promoting proper kitchen lighting to your employees. Notify the electrical contractors in your area. Have your contact men call on dealers and distributors. For more information, contact your nearest G-E sales district office or write General Electric, Dept. 166-WE-1, Nela Park, Cleveland 12, Ohio.

PUT THIS ADVERTISING TO WORK FOR YOU	
SATURDAY EVENING POST	BETTER HOMES & GARDENS
JAN. 31 — FEB. 28	MARCH

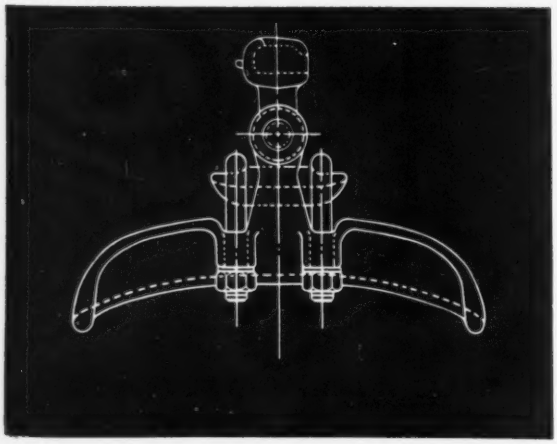
GENERAL ELECTRIC



Baltimore boosts its



MEN AT WORK Linemen install 556,500 cm ACSR conductors in place of 2/0 copper transmission conductors on this two-circuit tower.

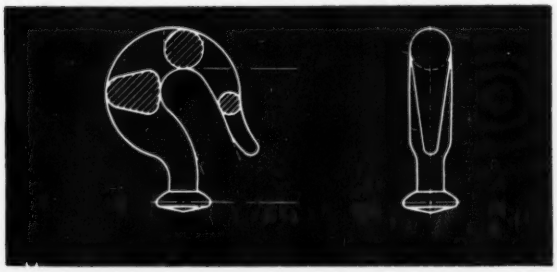


IN THE SPRING OF 1950, the Consolidated Gas Electric Light and Power Company of Baltimore began rebuilding its 110 kv ring system. This project was undertaken because studies of future load growth and planned generating facilities indicated the need for greater transmission line capacity.

THE COMPANY'S RING SYSTEM extends some 58 miles around the City of Baltimore, connecting generating stations at Westport and Riverside. Transmission conductors for the most part were 2/0 copper, with the remainder generally consisting of 4/0 copper. The Consolidated Gas Electric Light and Power Company's project called for replacement of these conductors with 556,500 cm ACSR on approximately 46 miles of line.

THE PROJECT INCLUDED the building of some 16.4 miles of additional line on right-of-way adjoining existing transmission lines. At several locations in this

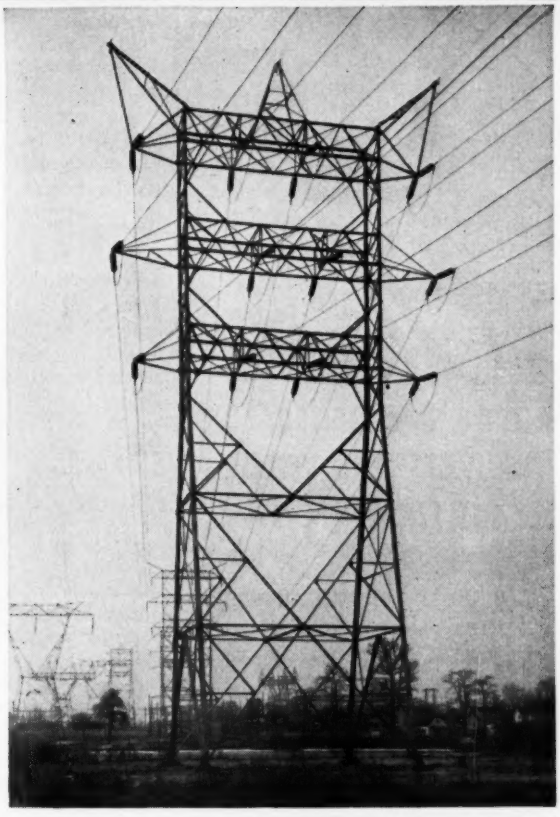
section, right-of-way limitations required the replacement of two-circuit transmission towers with four-circuit towers. This was accomplished under limited outage conditions by erecting temporary wood pole bypass lines which were operated while the two-circuit towers were replaced with the new four-circuit towers. In another section of the ring system, approximately 23.3 miles of transmission line including towers and conductors were replaced with heavier towers and ACSR conductors on the existing right-of-way. This was accomplished by installing new towers with split crossarms, after which the old towers were pulled over instead of unbolting and disassembling them.



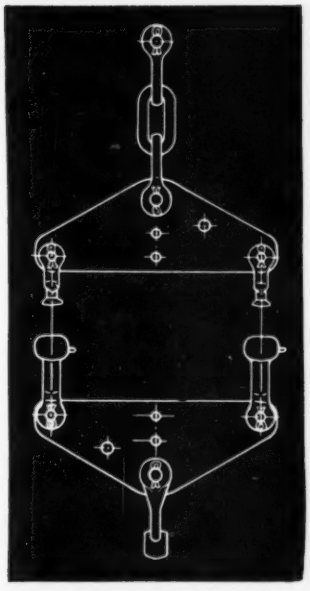
WITH THE WORK IN PROGRESS during high peak load periods and during the summer storm season, other special methods were devised to facilitate the completion of the project on schedule. In addition, transmission towers along 16.7 miles of line had to be reinforced to provide for the increased loading of the larger ACSR conductors.

Like so many major power concerns, Consolidated Gas Electric Light and Power Company of Baltimore used BTC Hi-Line Hardware on this project. Writes the company: "We have every reason to believe that its performance will be satisfactory." Specify BTC Drop Forged Clamps and Fittings for all your transmission line projects. You'll find they're easier to install . . . give trouble-free performance . . . and help hold maintenance to a minimum.

Sold through your insulator manufacturer only



PROJECT COMPLETED New four-circuit transmission towers like this replace two-circuit towers in several locations along Consolidated Gas Electric Light and Power Company's newly rebuilt 110 kv ring system.



Drop Forged **BTC** ***Hi-Line Hardware***

The **BREWER-TITCHENER**

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MOTOR and GENERATOR BRUSHES ARE VOTED "LEAST LIKELY TO FAIL"

"OHIO" brushes have attained a fine reputation throughout industry since 1916 for their rugged dependability and smooth operation. We have designed and produced, "from raw material through to the finished product," thousands of types of brushes for thousands of clients for practically every type of application. The continuous patronage of our clients is ample testimony of our ability to serve you in the same manner from every standpoint of good business ethics. Up-to-date, illustrated literature on our products is immediately available to you.

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PCEA Panorama

At two meetings under the auspices of the PCEA last month, four of the nation's most eminent cable engineers demonstrated the engineering basis for the National Electric Code Tables on carrying capacities for wires and cables. A. B. Smedley was moderator for the first meeting on Dec. 3 at Los Angeles, and William A. Cyr led the discussion at the San Francisco meeting on Dec. 9.

The special committee appointed by PCEA's board of directors to organize the meetings consisted of I. W. Borda, chairman, G. C. Tenney, T. L. Rosenberg, O. R. Doerr, R. G. Holabird, J. H. Pengilly, G. N. Hawley and S. F. Hill. As a result of the committee's efforts 32 co-sponsors joined with PCEA in presenting these factual demonstrations and discussions for all interested companies, organizations and individuals. On Dec. 18 the directors instructed the committee to continue its efforts in exploring the possibility of reconciling the differences between the National Electric Code tables and the tables now in use in the California Electrical Safety Orders.

At its Dec. 18 meeting the board also appointed a new nominating committee to submit the names of candidates for association president and ten directors for next year. Members serving on the committee with Chairman F. A. Tracy are R. N. Dreiman, J. H. Pengilly, K. M. Ryals, S. W. Scott and D. P. Cady. Elections will be held at the annual meeting, which is the last day of the convention on May 15.

The annual convention next spring will be held at Hoberg's famous old resort in Lake County, 100 miles north of San Francisco. Informality will keynote the three-day meeting, May 13, 14 and 15, which should be especially productive and enjoyable amidst such beautiful surroundings. Tentative plans include the use of chartered airliners direct to Hoberg's landing strip, and chartered buses from San Francisco.

Already in high gear, the membership committee reports 10 new company members: Bendix Home Appliances Division, AVCO Mfg. Co.; Consolidated Western Steel Division, U. S. Steel Corp.; I-T-E Circuit Breaker Co.; Macco Corp.; Pacific Wire Rope Co.; Sheeter and Co.; Soapstone Duct; West Coast Electric Mfg. Co.; Harry Appleton Co. Inc.; Automatic Electric Sales Corp. Two past members who have just renewed their affiliation with PCEA are: Bakeman and Associates and Ladco Wholesale Electric Co.

PCEA's managing director, Vic Hartley, has been appointed program committee chairman for the International Association of Electrical League's eighteenth annual conference to be held at the Fairmont Hotel, San Francisco, Aug. 5 to 8. Other PCEA members who will be active in the 1953 IAEL annual conference are L. H. Bennett, Northern California Electrical Bureau manager, chairman of the San Francisco committee on arrangements; Clark Chamberlain, San Diego Bureau of Home Appliances chairman; and Glen L. Logan, manager of the Electric League of Los Angeles. Both Vic Hartley and Clark Chamberlain are past presidents of IAEL. Preceding the meeting, on Aug. 4, Pacific Gas and Electric Co. will take the entire party on a tour of its new Moss Landing steam plant.

NWEL&PA Plans

Two spring meetings of sections of the Northwest Electric Light & Power Assn. were set up at planning meetings in Spokane this month. The Engineering and Operation Section will convene at the Multnomah Hotel, Portland, April 8-10, 1953; the Business Development will go to the Davenport Hotel, Spokane, May 4-6.

Tom Purton, Utah Power & Light Co., chairman of the Engineering Section, announced that the three-day sessions would be divided between the following committees, whose chairmen would organize a program to fit into the time allotted to them: Power Production, Howard Arnett, Portland General Electric Co.; Electrical Equipment, Corbett McLean, Pacific Power & Light Co.; Transmission and Distribution, Sam Pearson, Portland General Electric Co.; Utilization, J. H. Steede, British Columbia Electric Co.; Meters, Codes and Services, George Donnelly, Idaho Power Co.; Electronics, W. H. Blankmeyer, Montana Power Co.; and House Heating Research, R. E. Sinclair, Pacific Power & Light Co.

The customary banquet will be scheduled and other affairs to interest the delegates will be planned by M. D. Duffy, Pacific Power & Light Co., chairman of local arrangements.

The Business Development Section under the chairmanship of Carl L. Hoffman, The Washington Water Power Co., will schedule both general sessions, where top industry speakers are invited to participate, and paral-

lel sessions for the several bureaus and committees to attack their problems. One half-day session is to be turned over to the president of the association, John Dierdorff, Pacific Power & Light Co., who will arrange a program tackling some of the problems of top management.

Bureaus and committees to hold shirt-sleeve sessions under their own chairmen are: Commercial and Industrial Bureau, Arno Gish, Pacific Power & Light Co.; Electric Home Bureau, Don Rennewanz, Hotpoint Co., Seattle; Rural and Farm Bureau, Frank G. Mackaness, Portland General Electric Co.; Advertising and Publicity Committee, Erl Campbell, B. C. Electric Co.; and Rate Research, Duane Olney, The Washington Water Power Co.

A banquet and a possible visit to the Cabinet Gorge plant recently put into service by Washington Water Power Co. are among the features being considered by L. C. Aston, Washington Water Power Co., chairman of arrangements.

IAEI

The joint meeting of Electrical Contractors of Washington and the Puget Sound Chapter of the International Association of Electrical Inspectors was held in Olympia, Wash., on Dec. 12-13, with an attendance of more than 100 members of the industry. A seminar on the electrical code was conducted by Arthur Seigel, president of the Electrical Contractors and a film shown by Alcoa on application and soldering of small-diameter aluminum wire. Considerable discussion ensued on aluminum connections and methods for preventing corrosion at connections.

Tom Widrig of Trumbull Electric Co., gave an extensive discussion of the 1935 electrical licensing law, under the subject "Electrical Inspection Legislation, and what it means to You." Widrig, active in the Northwest in promoting the cause of the electrical inspector, is chairman of the legislative committee of the Washington State Electrical Council. This council, composed of representatives from all branches of the industry, is now actively engaged in supporting a supplement to the existing Washington State Electrical License Law, which would authorize a permit fee system for state-wide electrical inspection, without certain bounds and limitations.

The Puget Sound Chapter of the Northwestern Section IAEI named the following officers for 1953: chair-

TEL-E-LECT "325" Attachment . . . Derrick and Digger Unit

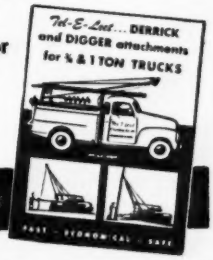
For 3/4 and 1-TON TRUCKS

Why send a five man truck and crew on pole replacement or service jobs that can now be handled by two men and a highly portable ¾ or one ton service truck? The "325" attachment makes it possible for two men to set up the derrick, attach the digger, dig the hole and set the pole ready for tamping *in less than ten minutes*! This set-up, with or without radio communication, speeds up line work and cuts costs way down.

★ No more using five-man crews on two-man jobs

★ Sets poles up to 35'; take augers 8" to 20" diameter

★ Packaged unit for installation by your local mechanic



See us at the N R E C A Convention in San Francisco

Write for Bulletin 325

TEL-E-LECT PRODUCTS, INC.

10,025 MINNETONKA BLVD. • MINNEAPOLIS 16, MINN.

PIN TYPES

SUSPENSION TYPES

SWITCH AND BUS TYPES

CLAMPS

BUSHINGS

Specify PINCO and PINCO PERFORMANCE will prove the wisdom of your choice!

Whatever your requirements may be—whether for electrical porcelain of either standard or special design, it will pay you to put your problems up to Pinco! In doing so, you will be placing responsibility in the capable hands of an organization backed by more than thirty years of experience in designing and producing the finest high-dielectric porcelain—made by the famous Pinco "wet plastic" process.

And remember too that the Pinco slogan "RIGHT ON THE JOB" is doubly significant. It expresses our ability to render efficient service—and is your guarantee of trouble-free "on-the-job" performance.

The Porcelain Insulator Corporation
LIMA, NEW YORK

PINCO INSULATORS

Warehoused and Distributed by
JOSLYN PACIFIC CO.
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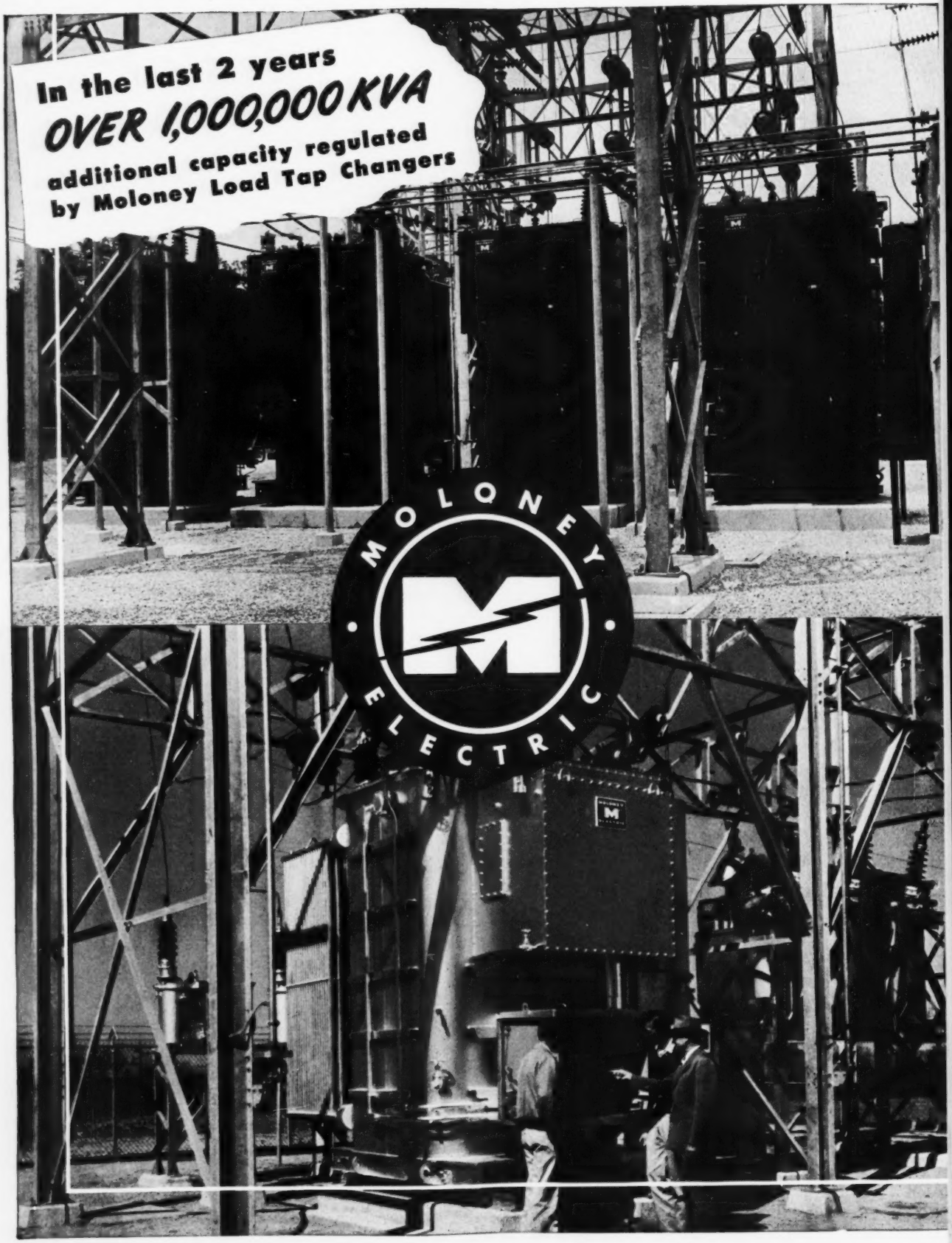
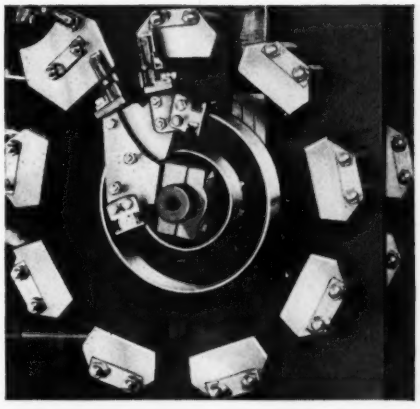

In the last 2 years
OVER 1,000,000 KVA
additional capacity regulated
by Moloney Load Tap Changers
MOLONEY
ELECTRIC

MOLONEY LOAD TAP CHANGERS

Offer these advantages for feeder voltage regulators, regulating transformers and load ratio control transformers

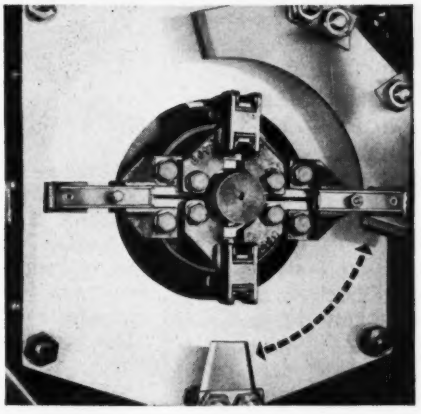
ELECTRICALLY

No arcing duty is imposed upon any of the tap selector switch contacts, avoiding the necessity for replacement due to burning or scoring. A separate switch is used for breaking load current, and a reactor in parallel with this switch during each opening and closing keeps arcing here to a minimum. Virtual elimination of arcing not only prolongs the life of the contacts but also preserves the quality of the oil in the tap changer compartment.



MECHANICALLY

The load transfer switch, which is the only switch required to transfer load current, is provided with accelerating springs and is driven by Geneva gears. The design provides a means of opening and closing the load transfer switching elements at a high rate of speed without shock to the gearing or other parts. Moloney Load Tap Changers have been inspected in the field after more than 500,000 operations and have been found to have no mechanical wear sufficient to require replacement of parts other than contacts.



MOLONEY ELECTRIC COMPANY

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS, MO. AND TORONTO, ONT., CANADA

Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control Transformers Step Voltage Regulators • Unit Substations

MOLONEY ELECTRIC = { BETTER PERFORMANCE / GREATER RELIABILITY / LESS MAINTENANCE

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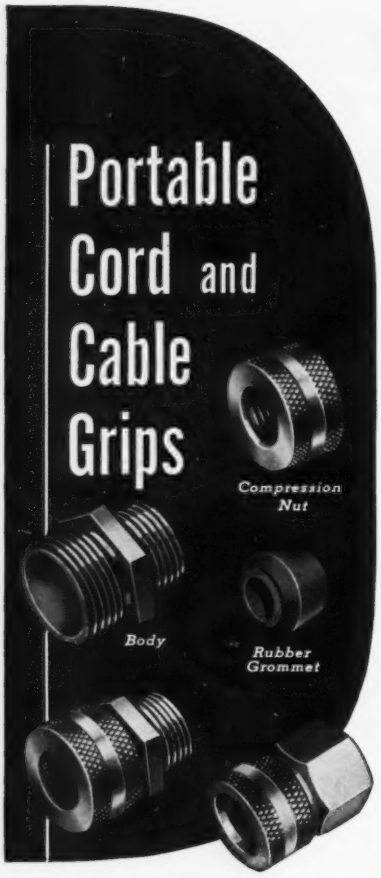


Cord and cable grips for portable wiring offer a complete line of substantially built fittings for heavy duty service. The standard types shown have aluminum body, aluminum compression nut, and single hole rubber grommet. Two and three hole grommets can also be furnished.

Angle types are available; also female bodies with or without chase nipples; also with serrated body for mounting in sheet metal panels or cabinets.

Compression nuts with split clamp, with hose attachment, with extended handle, or with cord protecting spring are available. Couplings for flexible conduit can be supplied.

Consult your Pylet Catalog 1100 for complete listings.

SINCE 1897

THE PYLE-NATIONAL COMPANY

1364 N. Kostner Avenue, Chicago 51, Ill.

man, J. Megler Girard, inspector, Aberdeen, Wash.; vice-chairman, J. H. Watt, associate electrical engineer, Seattle Building Department; secretary, C. S. Alger, Puget Sound Power & Light Co., Seattle; treasurer, E. M. Tubbs, electrical inspector, Bellingham, Wash.; executive committee, J. C. Hewitt, chief electrical inspector, State of Washington; G. M. Park, state inspector, Aberdeen; J. E. Hitch, state inspector, Everett.

WLMI

West Coast manufacturers of industrial and commercial lighting fixtures met in Los Angeles in December to establish the Western Lighting Manufacturers Institute. The organization will maintain headquarters in Beverly Hills.

Phillip Freeman, Sunbeam Lighting Co., Los Angeles, was elected president. Other officers include: Leonard Rosenblatt, Globe Lighting Products, vice-president; Joseph Marx, Nu-Lite Fluorescent Mfg. Co., secretary-treasurer, and Stanley Lindahl, Light Control Co., chairman, membership committee.

According to Freeman, the institute's activities will include: lighting information projects related to industrial production and workers' vision; research on industrial and commercial lighting needs and problems; employee and government relations and Western facilities for rating lighting products manufactured in the West.

NECA

Montana Chapter, National Electrical Contractors Assn., held its annual meeting at the Finlen Hotel, Butte, Dec. 13-14. Charles H. Simpson, new vice-president of District 8, presented an administrative committee summary of NECA activities. Matt Sherwood, Western regional director, San Francisco, presented the Business Development program and the national programs on legislation, etc. One of the topics of discussion was a proposed electrical licensing law for the State of Montana, which has been in preparation since the last meeting. This will be submitted to the Montana House and Senate for consideration in January. The bill has the support of the state electrical inspectors organization and the IBEW.

All Montana line contractors were invited to attend to hear what the NECA business development program contemplates for line work promotion but members of a rival organization did not appear. The chapter endorsed the business development program.

Chapter stability and financial good health were shown in the treasurer's report which indicated a big gain during the year. New officers elected for 1953 were: Bob Ikleberg, Dahlstrom Electric, Billings, president; Bill Cissell, C. P. Electric, Livingston, vice-president; Francis Poulson, Poulson Electric Service, Kalispell, secretary; Don Bodily, F. L. Guy Co., Bozeman, treasurer, and Past President Bob Rowe of Great Falls was continued as governor. District directors elected were: Myron Staves, Missoula; Dan McGinnis, Helena; and Price McConnell, Anaconda. William Blackmar Jr. is chapter manager.

Montana Chapter offered District 8 Vice-President Simpson as the host to the 1953 District 8 meeting, at Billings. This will be confirmed with other chapters and dates set for sometime in the spring.

Northern California Chapter, NECA, elected officers for its various branches during the past month. Ralph Askin, Ets-Hokin & Galvin, was named chairman and Walter Vance, California Electric Co., vice-chairman, of the Alameda County Branch. Joe Barnes of V. G. Electric was elected chairman and Wayne Willis of Contra Costa Electric Co., vice-chairman of the Contra Costa County Branch. The chapter's estimating class was holding remarkable attendance records. Of the 53 enrolled an average of 45 turns out each meeting. After Christmas holidays meetings will resume Jan. 6. Henry Tilson is instructor.

San Francisco Electrical Contractors Assn., a chapter of NECA, voted a change in dues structure to require a minimum of $8.30 a month dues per member, where the percentage of labor pay roll does not come up to this amount. Earl Peak Jr., who is conducting the estimating class, was highly commended by all for the interest maintained in the class and the amount of work covered to date. The apprenticeship committee chairman, Ed Lynch, announced that high school credentials and a transcript of the school records of applicants for apprenticeship is now required by the San Francisco joint apprenticeship committee. A request from Local No. 6, IBEW, for a 4% increase in wage rate for "an improved vacation plan" was held over until another meeting of the California conference of NECA chapters reports on the joint health and welfare problems. This committee is to make its report late in January, after it has studied the available plans and methods.

IAEI

Southern California Chapter, International Association of Electrical Inspectors, furthered uniformity in southern California by the publication of 4,500 pamphlets containing service grounding diagrams that had been developed by the chapter. At the Nov. 19 meeting at Compton under Chairman L. E. LaFehr, Southern California Edison Co., San Diego Gas & Electric Co. and the California Electric Power Co. were commended for financing the printing of these pamphlets for distribution by the chapter. Nominated for chapter officers in 1953 and subsequently elected were Barney Alverson, San Bernardino County electrical inspector, chairman; Willard Burk, Huntington Park, vice-chairman; and E. V. Muller, California Division of Industrial Safety, secretary-treasurer. The future meeting dates were set for Jan. 28 at Riverside, April 8 at San Diego, May 27 Long Beach.

IES

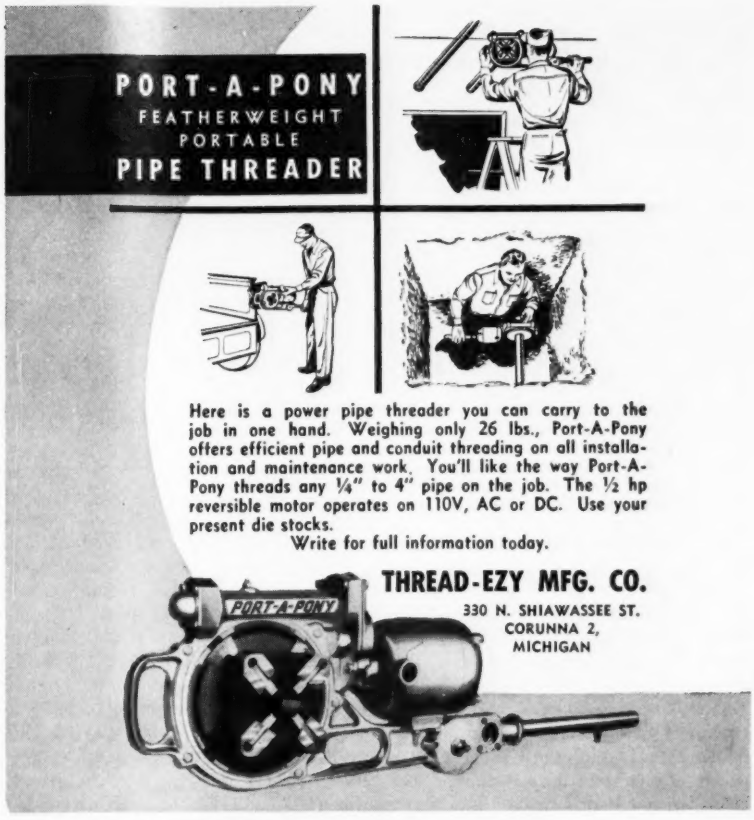
Utah Chapter, Illuminating Engineering Society, awarded prizes to three student architects for the best job in lighting design and specifications at its Dec. 11 monthly luncheon at Salt Lake City. Students were from the school of architecture at the University of Utah.

Oregon Section, IES, visited the new General Electric Co. Lamp Division's office and warehouse in Portland at its Nov. 12 meeting. An inspection tour was made to view the illumination provided by a wide variety of fixtures and lamps.

Newest chapter in the West of the Illuminating Engineering Society is the San Jose Chapter. Formal presentation of the charter and official gavel was made by Carl Martin, past regional vice-president, at the inaugural meeting Nov. 19. Leonard A. Hobbs, new regional vice-president, gave a report on the recent NEMA conference in Atlantic City and meetings of the RLM committees. Meetings are to be held on the third Wednesday of each month.

WME

The eighth **Western Metal Exposition** will be held at Pan-Pacific Auditorium, Los Angeles, and the Western Metal Congress at the Statler Hotel, March 23-27, sponsored by the American Society for Metals and other technical groups. A number of electrical firms will exhibit.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THE MONTH IN BRIEF

New Developments in Puget Power Sale

Stockholders of Puget Sound Power & Light Co. have received a letter from Kinsey M. Robinson, president of Washington Water Power Co., urging merger of the two companies, the proposal made earlier to Puget Power directors (EWEST, November, p 115). President Frank McLaughlin of Puget Power has filed suit in Chelan County Superior Court at Wenatchee against WWP and its directors and against J. W. Bryan and C. E. Ferguson, Kitsap County PUD commissioners. Without setting a figure, the suit asks compensation for damages already incurred and which ultimately could run into millions of dollars. The complaint asserted that WWP was involved in the legal action taken by two minority stockholders of Puget Power, who brought action in Massachusetts court to block the sale. The Kitsap PUD commissioners presumably were named because of their action in breaking what McLaughlin terms a "binding contract" for the purchase (EWEST, December, p 122). In another legal action filed in Thurston County Superior Court on Dec. 31, Bryan and Ferguson, majority members of the Kitsap County PUD who are opposed to the sale, brought suit against Thurston County PUD, asking for a restraining order prohibiting the district from issuing bonds or participating in the joint acquisition of Puget Power properties. They contend that the PUDs jointly are without power to acquire Kitsap properties without consent of Kitsap and that consent has not been given.

Court Rules for Bryan

Although leaving undecided the question as to whether J. W. Bryan of Bremerton, Wash., is legally entitled to the office of Kitsap County PUD commissioner, to which he was elected in 1950, the Kitsap County Superior Court ruled that Bryan's defeated opponent clearly has no claim to the position. Henry Brown, the defeated opponent, held that he is entitled to the seat because Bryan is not now a resident of the district from which he was elected. Bryan's residency is unchanged but Kitsap County since 1950 has changed its road district boundaries, which also are the boundaries of the three subdistricts within the PUD, without corresponding action by the PUD. A resolution before the PUD would change its boundaries to coincide with the road districts.

Unions Postpone Strike

Unions representing Seattle City Light employees at Seattle will continue contract negotiations after Jan. 1 rather than call the strike they had threatened for that day. Disagreement still exists on wage increases sought by the unions, but the city council has agreed to study the effect of union demands for elimination of new wage steps created in the 1953 budget and the substitution of a negotiated increase reflected in the steps heretofore established. The city proposed to add one experience level to each job classification, resulting in wage increases of $10 and $15 a month. The unions declare this is not enough. They ask for minimum wage increases of $25 a month, to be added to administrative raises based on length of service; separation of sick leave from vacation, with three weeks vacation and four weeks sick leave after 10 years; and clarification of the city council resolution on labor contracts "so as to provide for true collective bargaining."

Power Conservation Helps Northwest

Although another mandatory cut is probable before the end of winter, no further power curtailment in the Pacific Northwest is likely before mid-January, J. Frank Ward of Tacoma, chairman of the regional advisory committee of the DEPA, said at the end of December. Good weather and the voluntary curtailment program, plus 10% mandatory cut for firms using more than 8,000 kwh weekly, have reduced demand about 5% below last year. Without the conservation program, a 5% gain in demand would have been likely.

PUD Negotiating for New Aluminum Plant

Klickitat County PUD, Goldendale, Wash., is negotiating with the Harvey Machine Co. for a possible aluminum plant site on the Columbia River. Power would be obtained from new generation to be added during the next two years, E. E. Clouse, PUD manager, explained. Bonneville has agreed to provide Harvey with 40,000 kw still available for defense purposes, he said, and the PUD would provide another 40,000 secured from BPA under existing contracts and its priority for publicly generated power. More than 1,000,000 kw of firm power will go on the line before the Harvey plant is scheduled for completion in 1954, Clouse figures. This includes 400,000 from McNary, 280,000 from other federal projects and 460,000 from private and local developments.

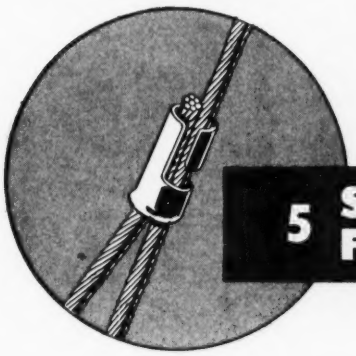
Raver Plan Would Substitute Regional Board for BPA

A plan to take the federal government out of the power business in the Pacific Northwest and to place control in the hands of a regional board was proposed last month by Bonneville Power Administrator Paul J. Raver. The plan, outlined before the BPA regional advisory council, is given in detail on p 120.

Arizona Communities Vote Franchises

Three south-central Arizona communities, voting Dec. 9, approved 25-year franchises for Arizona Public Service Co. The utility won electric and water franchises in Casa Grande and Coolidge, and an electric franchise in Eloy. The company will pay each town 2% of its revenue from retail sales of electricity for commercial and residential purposes within the corporate limits. Public Service, formed after merger of Arizona Edison and Central Arizona Light & Power, has received five franchises since its organization March 1.

WHICH?



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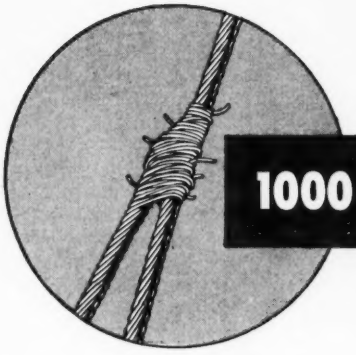

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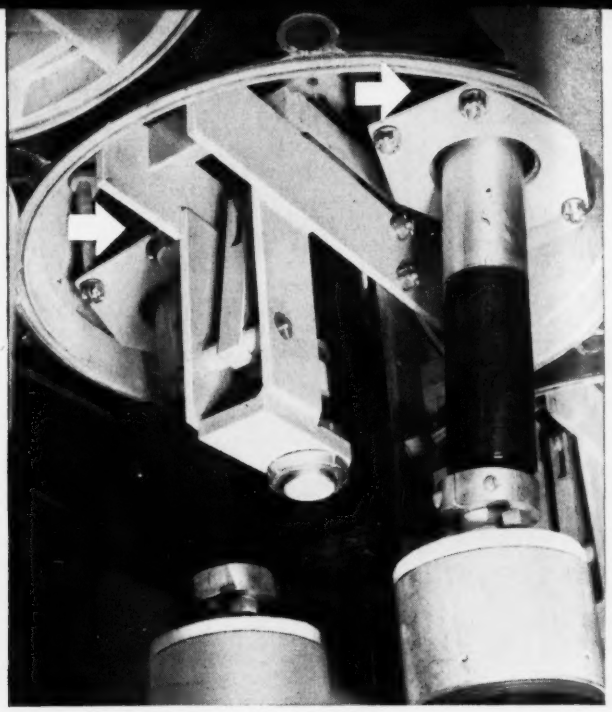
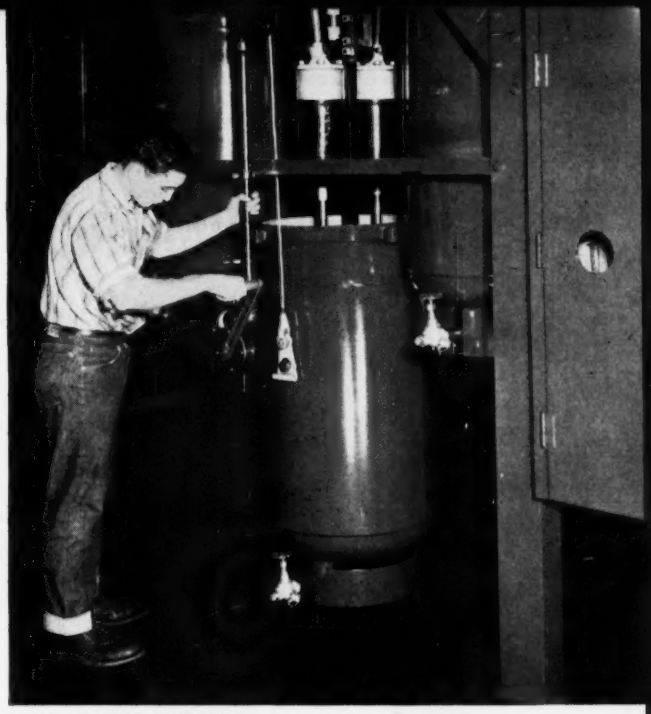


TWO CURRENT TRANSFORMERS provide extra metering when needed. New design provides room for installation of two transformers *on each bushing* as shown.



TANKS MAY BE LOWERED in the field for easy access to bushings and contacts. This makes it unnecessary to drain oil during inspection or maintenance.

New G-E breaker interrupts with shorter arc to cut oil maintenance

New design features improve reliability, simplify maintenance

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THIS MONTH'S NEWS

Raver Plan Would Take Power Out of Federal Control

Formation of an interstate power commission within Pacific Northwest states to take over functions of Bonneville Power Administration was proposed by BPA Administrator Paul J. Raver at BPA's regional advisory council meeting Dec. 16 in Seattle.

Under Raver's plan the new interstate agency would have authority to issue revenue bonds for construction of dams, determine priority of storage and generating projects and make sales agreements with private and public distributors.

Policy commissioners for the regional group, which would have to be approved by the various state legislatures, would be appointed by the governors or elected, probably by the legislatures, according to each state's wishes.

The Corps of Engineers and Bureau of Reclamation might be utilized as construction agencies, or they might not. Raver also urged a study of local assumption of costs of flood control, navigation and fish and wildlife phases, which are now paid directly by congressional appropriation as nonreimbursable costs not charged to power revenues of the dams. Raver intimated these might be paid from energy sales.

In appraising probable power rates, Raver said the new organization would likely result in a wholesale rate of $24 per kilowatt year instead of the present BPA rate of $17.50, which has been criticized as uneconomic. BPA rates are expected to go up (perhaps to $22.50) within a few years anyway because of higher construction costs.

Cost estimates, compiled by BPA Comptroller E. O. Ostrander, were based on construction of 34 projects, 15 of them major dams on the main stream of the Columbia and Snake Rivers or major upstream storage projects, the others smaller structures mainly in Oregon's Willamette Valley and Washington's Yakima Valley. Total is estimated at $5,516,000,000 on completion at today's costs.

Ostrander's appraisals assume that revenue bonds would pay interest. Nothing was said about taxes and the assumption was that Congress and the states would be asked to make

Continued on p 124

PROSPERITY in the USA: Who Has It?

How prosperous *are* the people of the United States?

The previous editorial in this series answered this question for the average American. His prosperity has increased only slightly in recent years.

But the average tells only a part, and in many ways not the most important part of the story. Which individuals and groups have prospered more, which less? (The average, the result of a statistical calculation rather than a creation of flesh and blood, tells nothing about that.)

The purpose of this message is solely to get at the facts on this question of how prosperity is distributed. This is not easy. In spite of the crucial importance of the subject, the available information is limited. Even so it is possible to provide a rough answer to the question, "Who has the prosperity?"

We Have Had a Revolution

The distribution of income in the United States has changed so greatly in the past twenty years that Arthur F. Burns, Research Director of the National Bureau of Economic Research, world renowned for its impartiality and technical competence, calls it "one of the great social revolutions of history." A part of this revolution is portrayed by the following table which shows that individual incomes are both much larger and much more evenly distributed than they were twenty years ago. Clearly, a large new middle-class has been created.

DISTRIBUTION OF REAL INCOME

Dollars of Income*	Per Cent of Families in Each Income Group	
	1929	*1951*
Under 1,000	17%	13%
1,000 – 2,000	24	15
2,000 – 3,000	24	18
3,000 – 4,000	14	18
4,000 – 5,000	6	15
5,000 – 7,500	9	14
7,500 and over	6	7
	100%	100%

*Adjusted for price changes to give the dollar its 1951 purchasing power.

Some light on why this income revolution has taken place can be found by tracing incomes to their source. Since 1929, for instance, employees have clearly made the biggest gains in total income. This can be seen in the next table. People who own their own businesses have done second best. Farmers, who are often thought to be doing handsomely indeed, have been outstripped in the income race by employees and businessmen. People whose incomes depend upon pensions, insurance policies, and other relatively fixed returns such as rent, interest and dividends have lagged far behind.

HOW REAL INCOME HAS CHANGED*

Types of Income	Percentage Change 1929 to 1951
Wages & salaries of employees.	+123%
Income of professional men & unincorporated business	+108
Farm operators' income	+56
Rental income	+1
Dividends	+2
Interest	−35

*In this and the previous table account is taken of changes in the cost of living. But adjustment for the changing tax load was not possible, as it is in the computations which follow.

The Biggest Gains

Employees have made the biggest gains in income, but the term "employees" covers a wide assortment of people—from the presidents of the biggest corporations to factory sweepers. How have different groups of employees prospered? Some indication is provided by results of a survey of salaries in 41 corporations made by Arch Patton of McKinsey and Company and recently summarized in the *Harvard Business Review.* This survey showed that between 1939 and 1950, after adjustment both for higher living costs and for higher taxes, factory and office employees made modest gains in income while management personnel suffered losses ranging from 40% to 60%.

While factory and office workers generally have made greater income gains than others, their gains have varied greatly from industry to industry. During the past five years, for example, steel workers' take-home pay (adjusted for both taxes and price changes) has increased by 22%, that of textile workers 9%, employees of general merchandise stores 4%, and that of laundry workers not at all.

What About Organization?

How have organized workers fared compared to unorganized workers? There is no round-up of facts that makes possible a direct comparison between the two. Such evidence as there is shows it is indeed an open question whether union members have done any better than others. Steel workers, for instance, who are strongly unionized are among the highly paid manufacturing workers. Farm workers are generally not unionized, and they work in one of the most competitive industries in America.

But farm workers have made income gains which far surpass those of steel workers. Real wages of farm workers increased 2½ times more than those in the steel industry between 1939 and 1952. This fact may prove nothing more than that, in a period of inflation and manpower shortage, the less skilled workers whose incomes are ordinarily low make the biggest percentage gain in income. Further support for this conclusion is found in the construction industry where real wages of unskilled labor increased 37% between 1939 and 1952, while those of skilled labor increased only 4%.

Why Most Incomes Are Higher

Prosperity, who has it? We may conclude that workers have been getting much more of it lately than managers or property owners, that unskilled wage and salary earners have made the largest gains, and that income generally is much more evenly distributed.

Where has the money come from to raise low bracket incomes? It has come partly from an increase in the total national income, but partly also from cutting down the share received by people in the highest income brackets. While the top 5% received 33.5% of the income after taxes in 1929, their share of income has now been cut about in half. For every $11 of increase in income to the lower 95% of income receivers, about $7 has come from increased production, and about $4 by taking that amount from the top 5%.

Top bracket incomes have now been cut so deeply that the possibilities of increasing the income of the rest of the people by "soaking the rich" have largely disappeared. Indeed, if all of the income after taxes of everyone earning over $25,000 in 1951 was taken away and redistributed among the remaining Americans, each person would receive only about $65.

The significance of this revolution in income distribution is clear. It is that there is only one way by which the great mass of us Americans can continue to increase our individual prosperity. This is by earning the increase through more and more efficient production. In plotting the economic course of the U.S.A. this fact is of decisive consequence.

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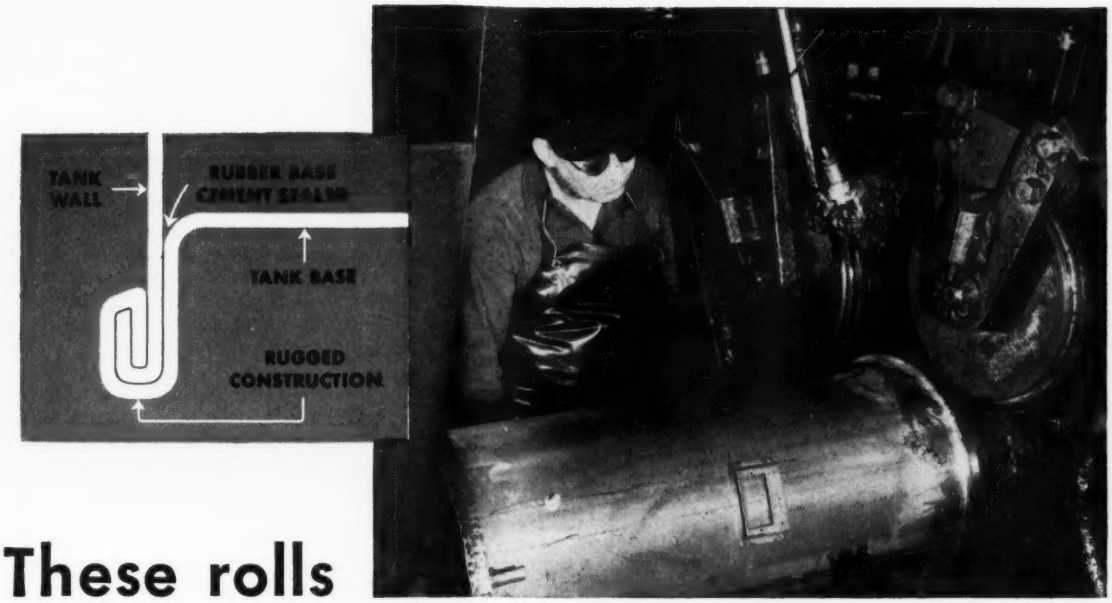

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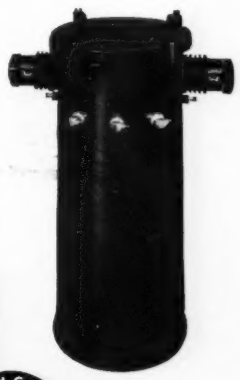

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RAVER PLAN GIVES POWER TO INTERSTATE COMMISSION

Starts on p 120

them tax exempt. An effort would be made, however, to have Congress take "Junior Promissory Notes" for repayment later or allow credit on the $1,250,000,000 debt involved in the existing federal investment of seven major dams and transmission systems now built or under construction.

Douglas McKay, who will be Secretary of the Interior in the new administration and has just resigned as Oregon's governor, said he knew the proposal was forthcoming but had not yet studied the outline carefully. He said he looked upon the plan with favor as something to examine carefully when he enters the Cabinet. He admitted his favorable first impression was based on recent discussions with Oregon's Senator Guy Cordon. Cordon, a member of the Senate Interior and Insular Affairs Committee, admitted he was in favor of basic changes indicated by Raver's outline but did not agree with all aspects. Specifically he was against the suggestion that any interstate agency might assume the financial burden of flood control, navigation and fish phases. "When Raver talks about nonreimbursable costs he's on his own," Cordon said.

Washington's Governor Arthur Langlie endorsed the general principal of state control of the river development and management but made it clear he believed some projects could not be financed except through the federal government. Langlie said any cooperative plan should be so arranged that the federal government's investment would be protected until paid off and that the future financing of large projects should be part of this agreement.

Asked about Raver's tenure in the post he has held for 13 years, McKay said that he had told Dr. Raver that he hadn't decided whether he would want him to stay with Bonneville but that if he decided he didn't intend to keep him, he would give him plenty of notice.

Other Plans for Power Setup Are Reviewed

Following the proposal of Dr. Paul J. Raver that an interstate power commission be formed in the Pacific Northwest, attention was focused again on two other recent plans for retiring the federal government from the sale and distribution of power.

The first, outlined in September by F. Ford Northrop, assistant superintendent of the Eugene, Ore., Water & Electric Board, envisages an interstate agency along the lines Raver proposed but with three major differences. The second, proposed in bill form in April by Gerard MacNamara, Portland builder, calls for a nonpolitical group consisting of the present utilities to take ownership and operation of the Bonneville transmission system and buy energy from the government-built Columbia basin dams.

Under Northrop's plan, financing would be done by issuance of revenue bonds, by borrowing from banks, investment houses, insurance companies, federal and state agencies, through congressional appropriations or other means deemed advantageous to the commission.

In connection with flood control and navigation projects, the commis-

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sion would contract with federal agencies for division of costs and operation. For example, the federal agency would build the dam and power house and regulate flow of water for flood control, navigation and fish travel; the commission would install generating equipment and controls and operate machinery with surplus water.

Northrop's proposal calls for building steam plants to augment hydro generation, an action not mentioned by Raver.

MacNamara's proposal calls for a Northwest power marketing grid to buy power at federal dams and transmit it to member companies.

By June 30, 1994, the grid would repay with interest the total amount of the government's net investment allocated to power in Grand Coulee and Bonneville Dams and BPA's transmission system. The grid would pay operating, maintenance and replacement costs of power equipment at these dams and of the present BPA transmission system.

Energy rates would be set by the Federal Power Commission on the basis of installed generating capacity so as to return to the United States the full cost of all capital outlays made by it for electrical energy and transmission in the grid operating area with interest by the 1994 date.

Except for a revolving fund of $10,000,000 to be carried through the first three years of grid operation, rates to members would not yield any profit to the grid. To provide funds for expansion of facilities the grid would submit a capital outlay program to the FPC for an adjustment of rates that would yield enough money to amortize loans at prevailing interest rates.

More Direct Benefits for Local Interests Advised

With most of the proposed large upstream storage projects in the Columbia River Basin stymied by the opposition of local interests, B. E. Torpen of the Corps of Engineers proposed to the Bonneville Regional Advisory Council at Seattle that residents of the areas affected by the proposed dams be given a "more direct sharing of the benefits which flow from these great projects."

Such a "direct sharing" would remove "many of the objections to some of the projects," he believes. It might take the form of allocation of power to a state, preferential rates, payments in lieu of taxes, liberal severance damages and generous reconstruction of public utilities, Torpen suggested.

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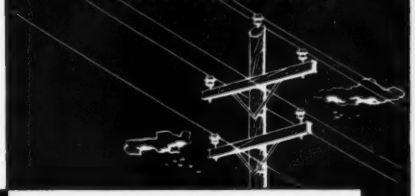

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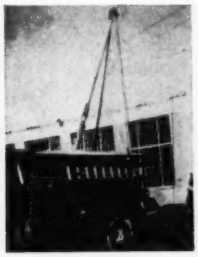

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FOURTH UNIT PROPOSED FOR HIGHGROVE PLANT

California Electric Power Co. will build a fourth unit, rated at 40,000 kw, at its new Highgrove steam generating plant, located between Riverside and San Bernardino in southern California. Work on the new unit will start in 1954 with completion scheduled for November 1955.

The utility placed two 30,000-kw generating units in operation at Highgrove several months ago, and construction is well under way on the third unit, rated at 40,000 kw. Unit three will be completed late next year.

The $20 million Highgrove plant will supplement Calectric's hydrogenerated power sources in the High Sierras and at Hoover Dam, adding 140,000 kw to the generating capacity.

Fluor Corp. of Los Angeles is contractor for the plant, using outdoor type of construction. A common firing aisle and a control room are the only two facilities in the part of the plant already constructed that are under a roof.

Wahleach Development is Put in Service at B. C.

Wahleach hydroelectric development of the B. C. Electric Co. went into service on Dec. 3 in ceremonies attended by more than 300 representatives of government and industry. Sixth generating unit built by the company postwar, the 82,000-hp plant is the largest in the system.

President A. E. Grauer pointed out at the dedication that in 1947, after 50 years of service, the company had developed 253,700 hp and in the five years from 1948 to 1952, it had harnessed 385,000 additional horsepower. During this period, 32,900 hp was retired from service, bringing present system capacity on the mainland of British Columbia to 605,800 hp, he said.

Accidents Put Ross Dam Addition Behind Schedule

Partly as the result of six fatal accidents, completion of the first 90,000-kw unit in the new Ross power plant of Seattle City Light was delayed beyond its Dec. 15 schedule. After the sixth accident, the State Department of Labor & Industries issued a new safety order. Ed Sorger, state supervisor of safety, said investigation showed the basic cause of the loss of life was a pressing schedule that made it necessary to expose workmen to hazards not normally encountered. He said several jobs had been under way, one above the other, in the 200-ft shaft leading to the intake tunnel. Men on the lower levels were endangered by falling timbers or metal. The sixth death occurred when a metal hook dislodged and fell 80 ft. One part of the new order prohibits such stacking of crews.

Three Generators Operating At Rock Island Dam Project

Beating its revised schedule by almost three weeks, the third 25,000-kw generator at Rock Island Dam went on the line on Nov. 26. The addition to the Puget Sound Power & Light Co. plant, built by Chelan PUD, was first scheduled for completion on Feb. 1, 1953, was rescheduled in mid-1951 for commercial operation by Dec. 15, 1952. The first two generators, both ahead of schedule, began operation on Sept. 13 and Oct. 17.

Power from the three units will permit the Aluminum Co. of America's reduction plant at Wenatchee to reinstate its second pot line, which went out of production in September when Bonneville was forced to drop all interruptible power loads.

Six new units are being installed at the dam by the PUD under agreement with Puget Power, all the additional power to go to the Alcoa plant.

OPERATION DIM-OUT—As the Pacific Northwest power shortage began idling industries, civic groups took up the battle to conserve kilowatts. Here members of Portland's Hollywood Booster Club place poster asking customers to "excuse our dim-out" and to carry on conservation in the home

ENGLISH FIRM BIDS LOW ON NORTHWEST CONTRACTS

The English Electric Co. of Stafford, England, submitted a low bid of $1,831,880 to the Corps of Engineers at Seattle, Wash., for furnishing ten 103,300-kva transformers for Chief Joseph Dam on the Columbia River in north central Washington. Nearest American firm in the bidding was the Moloney Electric Co. of St. Louis, Mo., at $2,203,798, with other bids ranging up to $2,491,630. The contract calls for delivery of three units by June 1, 1955, with final deliveries a year later.

English Electric Export & Trading Co. Inc., a subsidiary of English Electric, was low bidder on a contract to furnish two transformers for a City Light substation at Seattle. Its low bid of $691,620 was firm, while four American companies specified escalation clauses of 20% to protect themselves against increases in labor and material costs. Low American bidder was the Pennsylvania Transformer Co. at $815,920.

English firms have bid low on electrical equipment contracts in the Pacific Northwest on several earlier occasions but always have lost out on the contract because of failure to meet specifications.

Power Shortage Averted in San Fernando Valley

In time to avert a threatened shortage, power from the Aqueduct and Owens Gorge hydro plants of the Los Angeles Department of Water & Power started flowing into the west San Fernando Valley on Dec. 15 over a new 138,000-v line connecting the department's new receiving station J with Sylmar switching station.

Initial operation of the line will supply the west valley area with an additional 35,000 kw. Only a part of the facilities at station J have been installed. When all work has been completed, the station will have cost approximately $6,600,000 and will have a capacity of 240,000 kw. The new 512,000-kw Valley steam plant, now under construction, eventually will be the major power source for the station.

Work on the 7½-mile transmission line could not be started until Oct. 1 and the 50 steel towers were erected and about 37 miles of aluminum conductor were strung in 75 days, in a race to beat a power shortage threatened by the rapid growth of the area.

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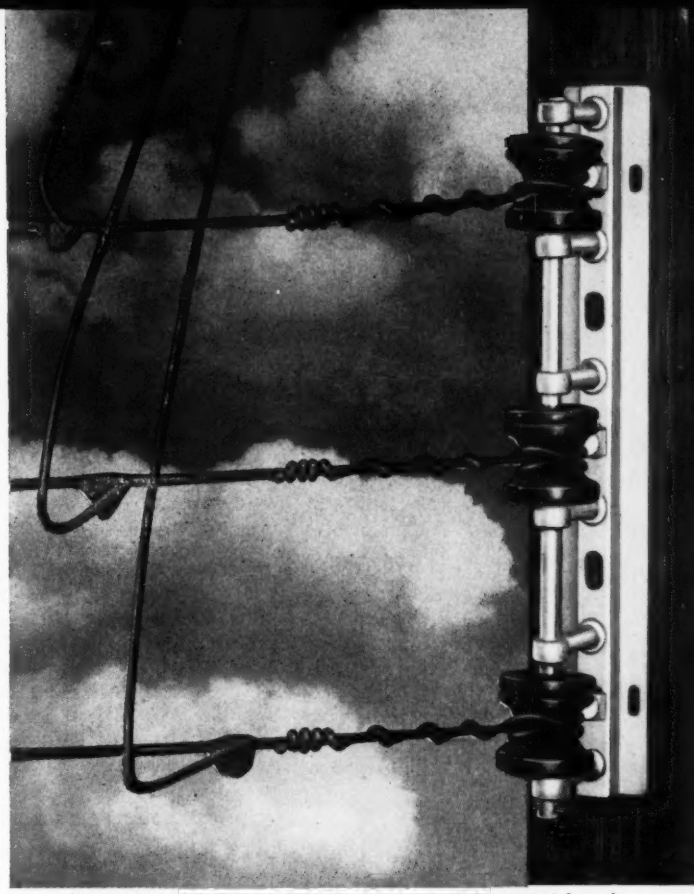

Medium Duty Rack—non-extended back. Note smooth, rounded forged steel legs which eliminate moisture-collecting pockets.

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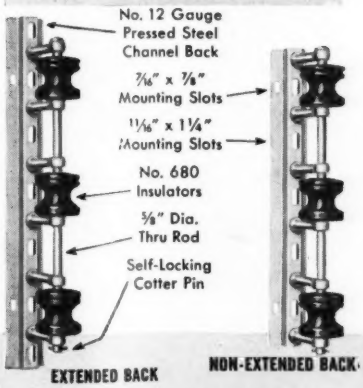

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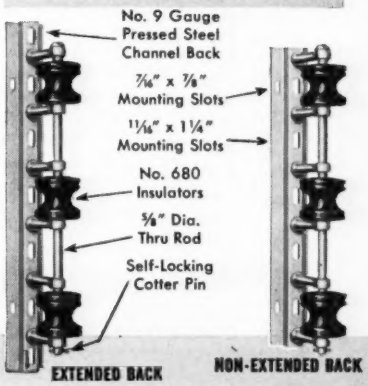

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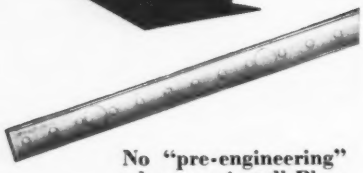

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SECOND UNIT AT YALE PLANT READY TO GO ON THE LINE

Second 54,000-kw generator at Pacific Power & Light Co.'s Yale project on the Lewis River was undergoing mechanical tests last month and was expected to be in operation about Jan. 1. When switches are thrown the company will have more than doubled installed hydro capacity since 1948 and will have completed its $30,000,000 Yale plant in a record-breaking 19 months since it received DPA go-ahead.

Drought has kept Yale reservoir below minimum level required to put unit No. 1 on the line at capacity. It was ready Nov. 18 and began load testing in early December on a 16-hour-a-day schedule to help peaking strain on the power pool. Despite limited use, the machine has been performing beyond specifications, according to E. Robert de Luccia, PP&L vice-president and chief engineer.

Colorado Public Service Building Branch Office

Construction has begun by Public Service Co. of Colorado on a new $850,000 branch office and warehouse on a 10-acre tract in northeast Denver.

Main function of the new structure will be to house the accounting and engineering offices of the electric hydro transmission department and the steam production engineering division of the company. Also to be housed on the new site are construction and service trucks in both the gas and electric divisions.

The single-story brick and concrete building, scheduled for completion May 15, will incorporate a main office covering 82,000 sq ft and an automotive service building utilizing 22,000 sq ft. Other departments to be included at the main office are appliance service, gas customer service, electric distribution and line construction, carpenter shop, and stores and transportation facilities.

Oregon Holds Industrial Safety Council

The Governor's 4th Annual Industrial Safety Conference for the state of Oregon was held at the Masonic Temple, Portland, Dec. 4 and 5. The conference was for safety engineers of all industries, but featured a panel for utilities on the afternoon of Dec. 4 and the morning of Dec. 5, when the conference broke up into various panels for different industries. The conference, which opened with an address by Douglas McKay, governor of Oregon, ended with a general session to receive recommendations from the various sections. Safety engineers and supervisors of accident prevention work in electric utilities in the state were invited to attend the conference.

Mokelumne Construction Beats Winter Snowfall

Rushed to completion just as the winter snowfall was starting, Pacific Gas and Electric Co.'s new Bear River Project on the Mokelumne River in the High Sierra was ready to go into service in mid-December.

The $11,000,000 development will generate 29,000 kw of electricity when full operation begins with the runoff of melting snow next spring.

Harnessing the waters of the Bear River, a tributary of the Mokelumne, involved building a 245-ft rock-fill dam, and a reservoir with a capacity of 48,500 acre-ft. A tunnel 8½ ft wide and 11 ft high was bored 2½ miles through the mountain to divert the stored water to the turbine of the generating unit.

The new unit is installed in the old Salt Springs power house and stands alongside an existing unit operated by the main waters of the Mokelumne, so that two units side by side are driven by water from two different sources.

It is the first sizable installation of a high-speed, multijet impulse or bucket-type waterwheel mounted on a vertical shaft. The normal mounting is with a horizontal shaft and a single jet of water to drive the wheel. The Bear River unit has three jets.

Additional water storage created on the Mokelumne watershed will also increase annual power output of three other PG and E plants down the river, the Tiger Creek, West Point and Electra power houses.

Total effect of the project in new electric power generation will be an estimated 153 million kwh annually.

● **Bonneville Power** Administration has awarded transformer contracts to Pennsylvania Transformer Co., Canonsburg, Pa., for $237,494 and to Wagner Electric Co., St. Louis, Mo., for $379,488.

● **Hearings** will be resumed by FPC Feb. 16 in Washington, D. C., on several proposals for importation of natural gas from Canada to the Pacific Northwest.

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SAFETY FEATURES: Provision for padlocking enclosure catch and handle in either position. Clear ON-OFF marking on cover and interior.

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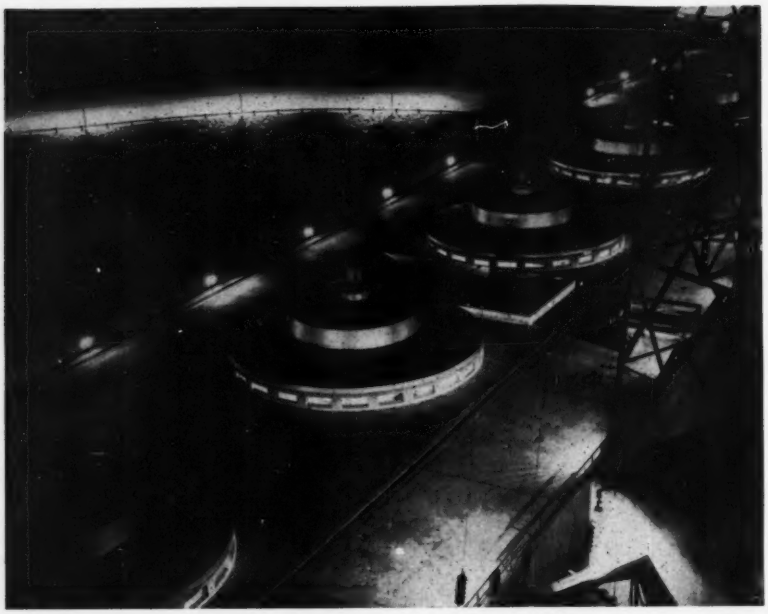

Davis Dam, 67 miles below Hoover Dam, was dedicated Dec. 10 by Michael W. Straus, reclamation commissioner. Western state governors and representatives of the federal government and of Mexico participated in the ceremonies. This night photograph shows the power plant's five 45,000-kw semioutdoor-type generators, which produced nearly a billion and a half kilowatt-hours during the first full year of operation. USBR photo

New Yukon Hydro Plant Supplying Mines

Light and power are now being supplied to lead-zinc and silver mines and communities in the Yukon by a newly opened 2,250-kw hydro plant near Mayo Landing, 215 miles north of Whitehorse.

Power is being delivered to the settlements of Mayo Landing, Galena and Keno Hill. Previously, electricity came from costly diesel generating plants at the mines. Homes mostly used oil lamps for light.

The new hydro plant can be expanded to 4,500 kw. It is operated by the Northwest Territories Power Commission and provides adequate power for development and production operations of United Keno Hill Mines Ltd. Power house and main dam are on Mayo River, five miles north of Mayo Landing.

Three-Dam Development on Stanislaus River Approved

Bids will be called immediately for construction of a $52 million three-dam project on California's Stanislaus River, following approval of a bond issue by South San Joaquin Irrigation District voters.

Residents voted to issue $26 million in revenue bonds as their share of the cost. Voters in the Oakdale Irrigation District had already approved a similar bond issue.

Three dams and three power houses will be built on the river at Donnells, Beardsley and Tullock to provide storage space for 230,400 acre-ft of water and produce 81,000 kw.

Bonds will be paid by selling power to Pacific Gas & Electric Co.

● **Instructors** in communications subjects are needed at the Southwestern Signal Corps Training Center, San Luis Obispo, the Twelfth United States Civil Service Region announced. Entrance salaries are $4,205 to $5,060 a year. Instructors are needed in high-speed radio operation, field radio repair, fundamentals of electricity, power unit installation and maintenance, wire cable splicing, wire carrier and repeater systems, message center, manually operated central office switchboard, and teletype operation and maintenance. Applications should be sent to the Board of U. S. Civil Service Examiners, Southwestern Signal Corps Training Center, Camp San Luis Obispo, Calif.

● **Southern California Edison Co.** plans to offer at competitive bidding about Jan. 15 an issue of 500,000 shares of common stock.

POWER REVENUES FROM DAM ENRICH FEDERAL TREASURY

The federal treasury will be $2,100,000 richer after the first eight months of operation of the power plant at Hungry Horse Dam, thanks to revenues from power sales.

Preliminary studies to determine probable output were made by the Bureau of Reclamation in cooperation with the Bonneville Power Administration, marketing agency for the power.

The Montana plant will produce 260,000,000 kwh during the eight-month period ending next June 30, a major part of it during the critical winter power shortage months. The first Hungry Horse generator produced 30,326,000 kwh during November. The second generator started operation Dec. 1, and with both units operating at near capacity 24 hours a day, it was estimated 60,000,000 kwh would be produced during December.

Hawaiian Electric Co. Amends Rate Application

Hawaiian Electric Co. has filed a supplement to its application of July 1 asking for authority to increase rates on all schedules in amounts necessary to produce an additional $1,612,320 in revenue. Leslie A. Hicks, president, said the proposed increase would net $684,000 after taxes. He said the proposed new rate schedule indicates an over-all average increase of 12.35%.

Two intervention applications have been made to the Territorial PUC. One is from the federal government, the other from the Honolulu Gas Co. If allowed to intervene, the government would appear as a major customer of Hawaiian Electric and would take issue on a schedule in the new rates that would discontinue a discount to the government on certain voltages. The gas company would appear as a competitor but no indication was given of its argument.

● **Beaver Valley Electric Assn.** Inc., an REA-financed project north of Beaver City, Utah, has sold its assets, including an electrical distribution system to Telluride Power Co. Since its inception, the association has been served by Beaver City but growth of load made this impractical. The application of the company's standard rates to individual co-op members will bring savings in monthly bills, it was pointed out.

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EEI AWARDS WILL BE MADE FOR 1952 ACHIEVEMENT

An industrial electrification award will be added to the prizes offered through Edison Electric Institute in 1952. The award is sponsored by General Electric Co. in coordination with its *More Power to America* program. Each company entering the prize award contest must submit evidence of a power or industrial electrification program carried on during the year 1952. Certain rules are set up for the contest and size of presentation, etc. Information is obtainable from Edison Electric Institute, 420 Lexington Ave., New York 17. Other annual awards made by EEI include the Thomas W. Martin rural electrification award, the George A. Hughes awards for electric range, water heater, etc., promotion, the Laura McCall awards for outstanding home service work, the planned lighting awards, the Frank Watts awards to accomplishments in improving agricultural productive efficiency, the George Westinghouse awards for promotion of laundry equipment, Claude L. Matthews valor award to honor acts of devotion to duty requiring extraordinary courage and the Reddy Kilowatt annual report award. No entry can exceed 15x18 in. in size.

● **Sangamo Electric** Co. is sponsoring a $2,000 essay contest and research grant for senior electrical engineering students at the University of California, Berkeley, Stanford University and the University of Santa Clara. Winners will be selected from writers of a 2,500-word essay on the subject, "Application of Blondell's Theorem to Electric Power Co.'s Customer Metering and Probable Resulting Errors if Metering Device Has Less Than N Minus 1 Elements." First prize is a $1,500 research grant for a project defined as follows: "Investigate Integration and Indication for Billing Purposes, of Impulse Loads of a Duration as Short as One Cycle of Circuits by Means of Other Than Electromagnetic Principles." Other winning awards will receive $300 second prize; $100 third prize; $50 fourth prize; and four honorable mention prizes of $25 each.

● **FPC** has postponed until April 13 the hearing on Idaho Power Co.'s application for a license for its proposed Oxbow power project on the Snake River. The hearing had been scheduled to resume Jan. 12 in Washington, D. C.

NEWS ABOUT PEOPLE

● **David B. Hyer Jr.** was elected president of the Southern Colorado Power Co. to succeed J. B. French. In accepting the presidency two years ago, following retirement of the late W. N. Clark, French stipulated that he would stay in the position only until the beginning of 1953 when he would become a consultant to the board. French has remained as president of the Black Hills Power Co. during his association with Southern Colorado Power. He will continue as a member of the executive committee of Southern Colorado Power's board of directors. Hyer, whom French selected to be executive vice-president, is a graduate of the Georgia School of Technology, has been associated with utilities in the south in engineering construction and management posts. He was commercial manager of the Florida Power Corp. and Georgia Power Co. before moving to Pueblo.

● **Joseph S. Thompson,** president, Pacific Electric Mfg. Corp., San Francisco, was recently appointed to the National Electrical Manufacturers Assn. board of governors. He becomes the second Western member. **Charles F. Mullenbach** of Los Angeles is the other. In 1947 he was honored with a 50-year certificate by NEMA in recognition of his half century of service to the industry.

● **Lloyd A. Mashburn,** picked by Martin P. Durkin to be an assistant secretary of Labor in the Eisenhower cabinet, is a $10,000-a-year member of the California State Labor Commission. For seven years prior to his appointment to the state post in November 1951, he was secretary-treasurer of the Los Angeles Building Trades Council and before that he was business agent for the Lathers' Union local.

● **Warren D. Hardaway,** an executive of Public Service Co. of Colorado, died recently following a sudden heart attack. At the time of his death, Mr. Hardaway was superintendent of the company's hydroelectric production and transmission department. He started with Public Service in 1919 at the old Lacombe steam-electric station, now called Zuni station, in Denver.

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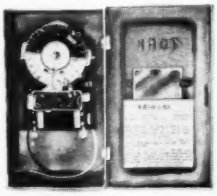

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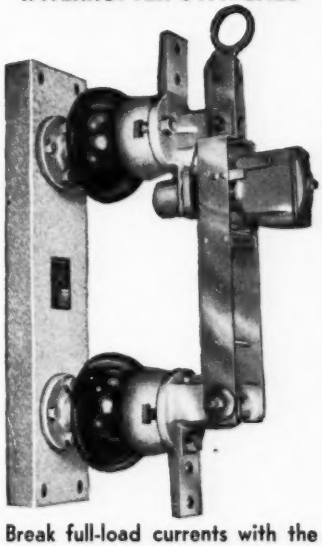

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NOTES ON THE TRADE

● **The National Safety Council** has awarded certificates of achievement to all six Westinghouse manufacturing and repair division plants in the Pacific Coast district. Certificates were granted to plants in Sunnyvale, Emeryville and Huntington Park, Calif., Salt Lake City, Portland and Seattle. In these plants, the accident frequency has been reduced 70% in the past five years.

● **General Electric Supply** Co. has formed a new district at Sacramento, Calif. The Sacramento operations formerly were a part of the San Francisco district. **E. M. Ames** is district manager; **L. S. Oppenheim,** sales manager appliances and electronics; **N. H. Fugelsang,** sales manager supplies and apparatus; **J. A. McGee,** operating manager.

● **The Sanderlin** Co. of Portland and Seattle has been appointed sales representative for Columbia Cable & Electric Corp. of Brooklyn, N. Y., makers of nonmetallic sheathed cable, armored cable, electric metallic tubing and flexible steel conduit. Sanderlin's Seattle office is at 129 First Ave. W. The Portland office is at 201 S. E. Washington.

● **Panama Lamp & Commercial** Co. Inc. has been appointed to introduce and distribute on the Pacific Coast Luve-Tile, a plastic illuminated ceiling made by J. A. Wilson Lighting & Display of Buffalo, N. Y., according to Guy de Leuze, Panama president. A colorful folder is available on request to Panama at 325 Ninth St., San Francisco 3.

● **Jeffries Transformer** Co. of Los Angeles has been purchased by G. L. Ohrstrom Associates of The Plains, Va. Founded nearly a quarter of a century ago by **Jesse C. Jeffries,** the company has more than 100 employees. No change in operation or policy is planned. With Jeffries remaining in an advisory capacity, management will be headed by **Raymand C. Schwarzenberg,** who continues as general manager.

● **Griffon Sales** Ltd. is introducing conduit fittings by Killark Electric Mfg. Co. of St. Louis, into British Columbia. This company is also handling electric motors, pole line hardware and fixtures. The Griffon company was organized two years ago and is steadily expanding its activities. **E. A. Adams** is manager.

Graybar's board of directors held its first meeting on the West Coast, Dec. 11, at the company's San Francisco headquarters. Purpose of the San Francisco meeting, in addition to regular business, was to acquaint the directors with the growth of the area, according to R. W. Kimberlin, Central Pacific district manager, who said that it was the first trip to the Coast for several of the directors. Pictured are from left: (seated) A. C. Lamperti, New York; W. E. Guy, Chicago; H. Metz, Long Island City; A. H. Nicoll, Los Angeles, board chairman; W. E. Henges, New York, president; G. F. Hessler, New York; C. S. Powell, St. Louis; (standing) H. P. Litchfield, New York; L. G. Fields, Richmond; F. E. Gibson, New York; R. W. Kimberlin, San Francisco; J. A. Mayer, Philadelphia; E. W. Cashman, New York; all directors and officers of Graybar Electric

● **Charles R. Long,** Pacific Coast district lamp engineer for Westinghouse, has transferred his headquarters from Los Angeles to 410 Bush St., San Francisco, as part of a move expanding the district's engineering service for Western customers. **Earl F. Larson** has been appointed to the newly created post of South Pacific district lamp engineer with headquarters at 600 St. Paul Ave., Los Angeles. Long was recently made a national director of the IES.

● **Pacific Electric Mfg.** Corp., San Francisco, has transferred its sales offices from Gary, Ind., to 122 S. Michigan Ave., Chicago 3, Ill., according to an announcement by E. F. Sixtus, vice-president in charge of sales. The Gary factory and service engineering facilities are being continued at 4500 Harrison St., Gary 10, Ind.

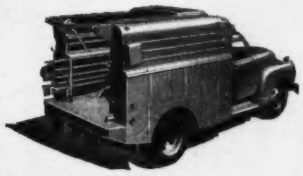
● **Delta-Star Electric** Co. has been merged into the parent organization, H. K. Porter Co. Inc., and will operate as Delta Star Electric division, it has been announced by T. M. Evans, president.

● **Anaconda Wire & Cable** Co. has granted all manufacturers right to use its molded magnet wire container. The container, which won first prize at the recent Industrial Packaging & Materials Handling Exposition in Chicago, is intended to replace the old-style wood type.

● **Williams Electric Motor** Service & Supply, 761 S. Seventh St., Grand Junction, Colo., and **Munnell & Sherrill** Inc., 400 S. W. First Ave., Portland, have been named distributors for Allis-Chalmers motors and controls. Williams Electric also will distribute Allis-Chalmers pumps and transformers in the state of Colorado west of the Continental Divide. It is operated by **Wilbur D.** and **Andrew R. Williams.** Munnell & Sherrill is headed by **J. Wreisner.**

● **A wholly owned** subsidiary of the Colorado Fuel & Iron Corp. of New York has contracted to buy all the manufacturing business, plants and inventories of John A. Roebling's Sons Co. The business will be operated as a subsidiary of Colorado under the Roebling name.

● **S. Murkin** of the Murkin Electric has moved his business to new premises on Marine Drive, West Vancouver, B. C.



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PUBLIC UTILITY BODIES AND EQUIPMENT

INDEX TO ADVERTISERS
January 1953

Allen-Bradley Co. 35, 36
Allis-Chalmers Mfg. Co. 13, 20, 21, 30, 31, 39, 51, 59
Anaconda Wire & Cable Co. 26, 27
Appleton Electric Co. 46

Benjamin Electric Mfg. Co. 105
Brewer-Titchener Corp. 108, 109
Briegel Method Tool Co. 61
BullDog Electric Products Co. 55
Burton Equipment Co. Inc. 124

Chance Co., A. B. 12
Chase-Shawmut Co. 120
Cole Electric Co. 138

Driver-Harris Co. 11

Electric Equipment Co. 124
Electrical Fittings Corp. 16

Gardner Electric Mfg. Co. 43
General Electric Co.:
Bridgeport, Construction Materials Div. 37
Cleveland, Lamp Division 107
Schenectady, Apparatus Division 1, 8, 9, 28, 47, 62, 118, 119, 137
Greenlee Tool Company 42

Hall Company, Fred C. 125
Honn Company, George E. 133
Hubbard & Company 117

Illinois Electric Porcelain Co. 125
Indiana Steel & Wire Co. 124

Jeffries Transformer Company 132

Kamphausen Co., Dan 44
Kearney Corp., James R. 40, 41
Killark Electric Mfg. Co. 131

Lapp Insulator Co. Inc. 48, 49
Line Material Company 3, 127
Locke, Dept. of G.E. Co. 17, 18

McCabe Powers Auto Body Co. 135
McGraw-Hill Book Co. 124
Marcus Transformer Company 54
Moloney Electric Company 112, 113

National Telephone Supply Co. 24

Ohio Carbon Company 110
Okonite Company 29

Pacific Coast Elec'l Association ..... 4th Cover
Pacific Gas and Electric Co. ..... 3rd Cover
Paranite Wire & Cable Div. 133
Penn-Union Electric Corp. 57
Porcelain Insulator Corp. 111
Pyle National Company 114

Revere Electric Mfg. Co. 56
RLM Standards Institute 25
Rome Cable Corp. 52, 53
Russell & Stoll Co. Inc. 132

Sangamo Electric Co. 14
Sherman Mfg. Co. H. B. 132
Simplex Wire & Cable Co. 33
Smith Co., S. Morgan 22
Smoot-Holman Co. 6
Soapstone Duct Co. 60
Southern California Edison Co. ..... 2nd Cover
Spang-Chalfant Div. Nat'l Supply 15
Square D Company 45
Sunbeam Lighting Company 10
Sperti-Faraday Company 115
Steel City Electric Co. 32

Tel-E-Lect Products, Inc. 111
Thread Ezy Mfg. Company 115
Tork Clock Company, Inc. 133
Trumbull Electric, Dept. G.E. Co. 23, 129

Victor Insulators, Inc. 7

U. S. Rubber Company 19

Western Insulated Wire Company 50
Westinghouse Electric Corp. 4, 5, 123
Wiremold Company 128

PROFILES

Gordon Luce

Sanders Glenn

Ocean met desert when Santa Barbara's California Central Coast Chapter, NECA, President John Gordon, Gordon's Electric Service, Ventura, shook hands with new Nevada Chapter president, Harvey Luce, Luce & Goodfellow, Las Vegas, at joint meeting

Western winners of $300 scholarships in the Westinghouse 4-H Farm and Home Electric Program examine a model electric power station at the National 4-H Club Congress. They are: Horace D. Sanders, Kalispell, Mont., and Lowell D. Glenn, Exeter, Calif.

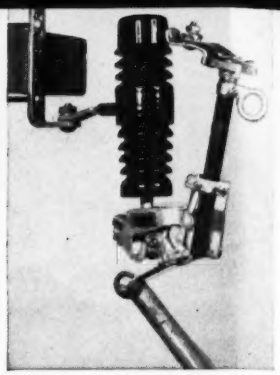
This picture of H. H. "Kelly" Courtright, manager of PG and E's San Joaquin Division, and Mrs. Courtright was taken during Christmas holiday trip to Hawaiian Islands

Mrs. Courtright H. H. Courtright

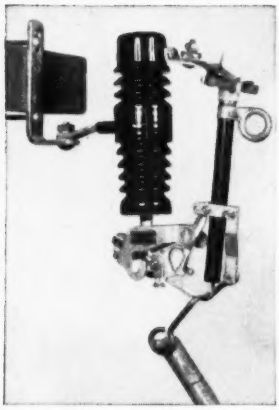
Orangeburg Mfg. Co.'s President H. J. Robertson looks over plans for company s proposed Newark, Calif., plant with J. R. Connell, Orangeburg vice-president, and G. W. Koch, Oakland Chamber of Commerce

Connell Robertson Koch

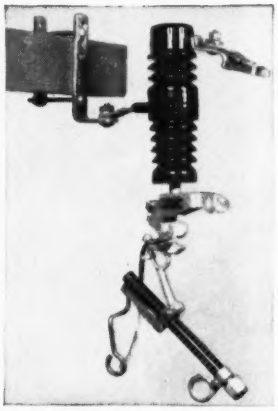
1 Fuseholder assembly showing how fuse-link cable passes over lever arm of load-break device.



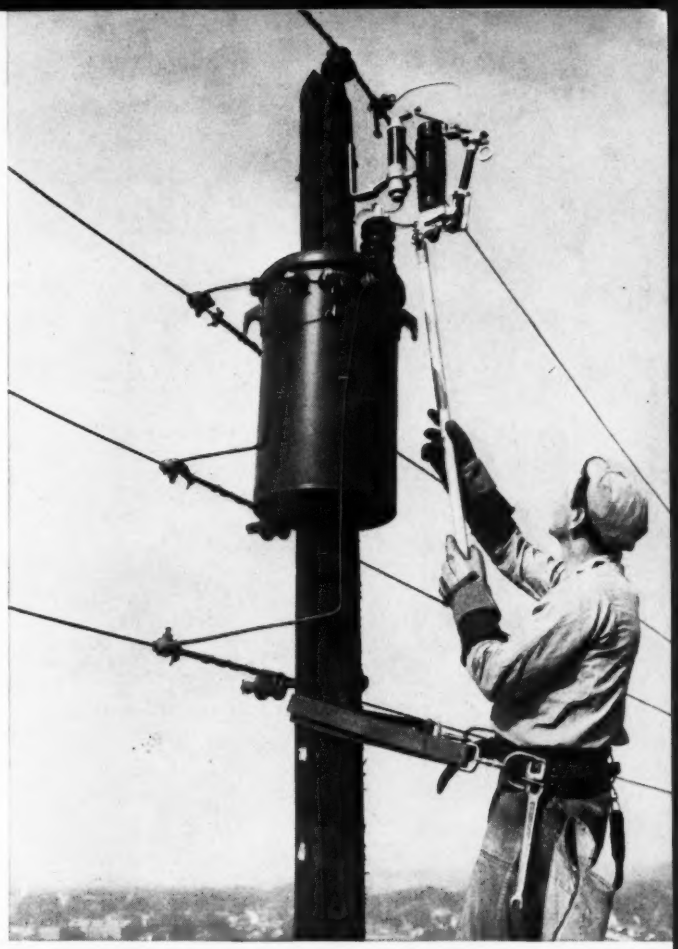
2 Downward pull on switchstick inserted in hook-eye breaks fusible element of fuse link.



3 When fuse link breaks, the cutout interrupts load current as it would interrupt a low fault current.



4 After current interruption, fuseholder drops open removing itself from the circuit.



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Liberal design of G-E cutouts permits simple load-break device

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Liberal design of G-E cutouts for full-range current interruption makes them ideal for breaking load currents. It also permits an extremely simple load-break device that consists only of a stainless steel lever arm coupled to the cutout fuseholder. The load-break device has no awkward protrusions or parts to stick, bind or otherwise interfere with the dropout action of the cutout. And it does not interfere with fusing or inserting and removing the fuseholder by switchstick.

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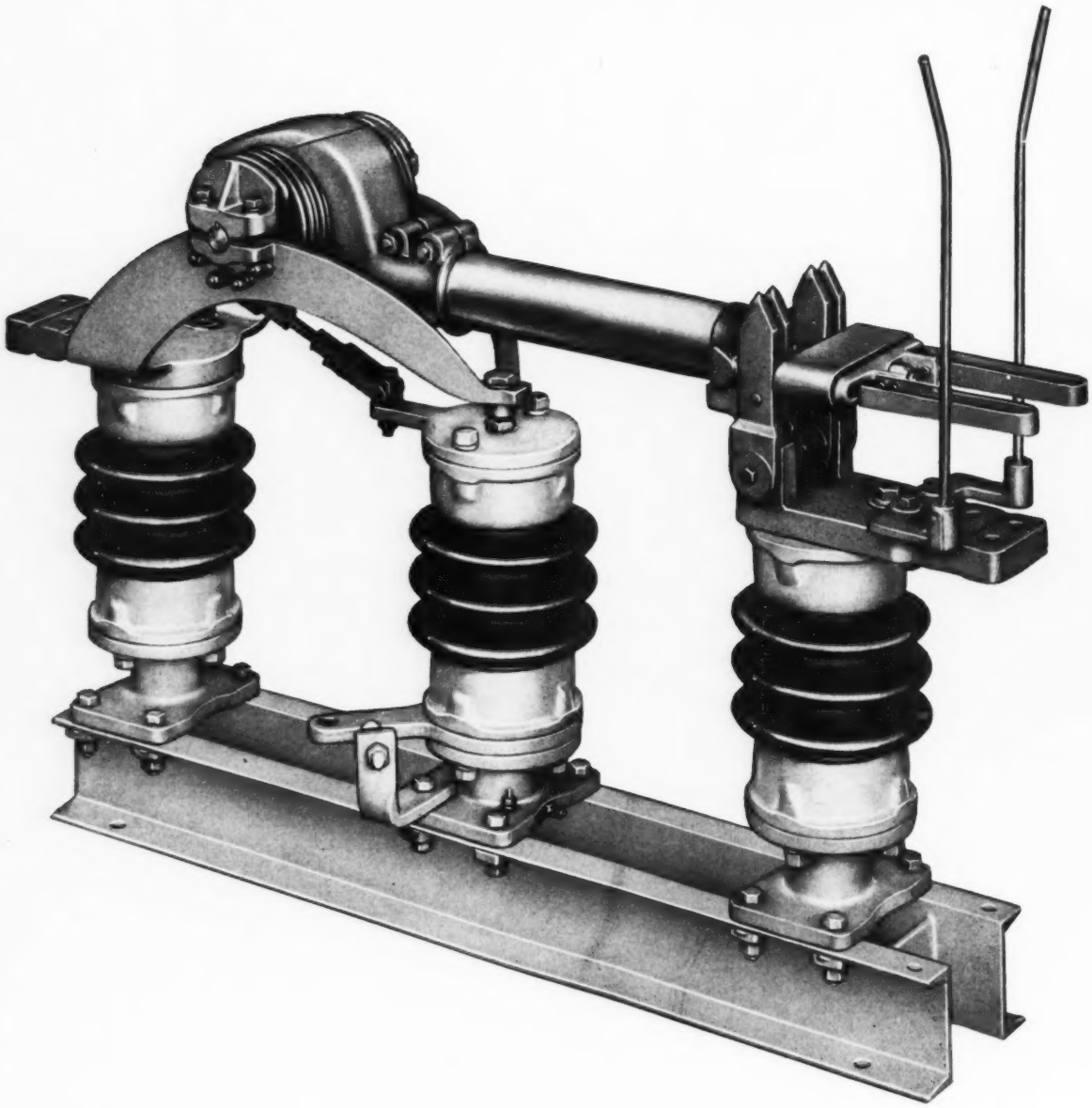

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